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VOLUME FIVE

PRELIMINARY HANDBOOK FOR INSTALLATION INSTRUCTIONS

CONTRACT NUMBER AF 33(600)-36457

GENERAL ELECTRIC

DEFENSE SYSTEMS DEPARTMENT • SYRACUSE, NEW YORK

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BOOK 8 of 10

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INTRODUCTION

This handbook includes all logistics and installation engineering necessary for installation planning, and installation procedures required for equipment installation.

The described logistics include equipment lists, procedures for procuring, handling and shipping the equipment, cable requirements, building specifications, and related accessories. The installation engineering section includes equipment layouts and siting criteria. Equipment installation and checkout procedures are also described.

This handbook is in preliminary form and will be issued in final form as part of the Phase 3 effort.

I. GENERAL DESCRIPTION

This section provides installation personnel with a basic concept of the Consolidated Subsystem from an implementation viewpoint. The Subsystem detailed design and operation are covered in appropriate reports and handbook.

The Consolidated Subsystem is a large scale document and data storage system providing storage and rapid retrieval of documents and data in various formats to satisfy specific requests for information. Due to space constraints, the Subsystem is located at two existing sites in the same general locality.

Photographs, Figure 1, Scale Model of Basement Area at Site A and Figure 2, Double Decked Scale Model of Basement Area at Site B, show scale model layouts of the major equipment areas for Sites A and B. Since the actual space has not been assigned for the Consolidated Subsystem, the area layouts were made using typical locations at the sites.

A functional description of the Subsystem and of each major equipment item is included in Volume Two.

The mechanical and electrical characteristics of the equipment are shown on the equipment lists, Figures 3 to 10 inclusive.

The total electrical input required by the equipment at Site A is 815 KVA, and 310 KVA at Site B.

A. Site A Area Subdivisions

1. Mail and Distribution

All incoming material is received here and sorted for delivery to the proper locations.

2. Communications

Messages from other sites are received here, and then distributed to the appropriate function. Messages to other sites also pass through this center.

3. Edit-Coding and Tape Conversion

Documents are prepared here for entry into the system.

4. Processing (Document Handling, Storage, and Retrieval)

The Documents are filmed and duplicate images filed in automatic retrieval machines. From these files, documents are regenerated by requests from the computer or the Request Formalization Area.

5. Request Control (Request Formalization)

Requests for information are received here and placed in the proper form acceptable to the Computer Complex or the retrieval equipment.

6. Records (Libraries)

a. Hard Copy Library

After being photographed, the documents are delivered to the Hard Copy Library where they are stored on shelves. They are available on request, by non-automated means.

b. Map, Chart, and Photo Library

The maps, charts and photographs are stored in a separate library.

c. Magnetic Tape Library

Magnetic tapes from the machine operation are stored in this library.

d. Safety File

The safety file for film originals and magnetic tape duplicates will be located in an ancillary facility (See Section II-D-1).

7. Machine Operation (Computer Complex)

The Computer Complex provides the data processing system with machine storing and searching for the documents in the system.

8. Photo Interpretation

The photo interpretation equipment area provides facilities for processing and displaying of photographs for purposes of photo interpretation.

9. Offices

This area provides space for management, for the analysts who will use the Subsystem at Site A, and for the operational and support personnel who are not housed in the equipment areas.

10. Other Areas

These areas include conference rooms, building maintenance areas, snack bars, and other Code 2-10 spaces not included in other categories.

B. Site B Area Subdivisions

1. Machine Operation (Computer Complex)

This complex differs from that in Site A in types and arrangements of data processing equipment since this Computer Complex performs a somewhat different function.

2. Request Control (Request Formalization)

This area functions in a manner similar to its counterpart at Site A.

It receives requests for information and puts them into a form acceptable to the Computer Complex.

3. Display

The display areas are equipped to present information in a visual manner suitable for group viewing.

4. Communications

Messages in various formats may be received and sent within the Subsystem.

5. Offices

This area, provides space for management, for analysts who will use the Subsystem at Site B, and for the operational and support personnel who are not housed in the equipment areas.

6. Other Areas

These areas include conference rooms, building maintenance areas, and other Code 2-10 space not included in other categories.

II. LOGISTICS

This section consist of the information necessary for procuring, shipping and handling the equipment, and housing the system. Since the system is to be housed at two sites, requirements which are not common are listed separately.

A. Standard Equipment Lists

The equipment lists for Site A are included in Figures 3 and 4, Equipment List, Computer Complex and Document Handling, Storage, and Retrieval Complex, and for Site B in Figures 5 through 10. These lists include vendor, catalog number, quantities, installation data and lead times. The lead time stated is the time between the placing of the order and the shipment of the item from the vendor's plant. All equipments will be purchased except as noted on these lists. However, the Purchase vs. Lease study in Volume Two, Part 2, Section V-G makes recommendations which increase the number of leased items.

B. Procurement

The procedures for procurement, shipment, test and installation will differ for the following items:

Equipment not commercially available,
Equipment commercially available,
Leased equipment,
Special essential parts,
Standard essential parts, and
Items for facility modifications.

All new equipments, supplies, and other items will fall into one of these six categories. It is the purpose of this subsection to describe the procurement procedures for each of these categories and then to show what items are included under each category. Items which fall under the first three categories are self-evident. Special essential parts include items such as magnetic tape, spare parts for special equipment, special office and machine furniture, and special test equipment. Standard essential parts include such items as GFE standard office furniture, office supplies, and standard office equipments. Items for facility modifications include diverse items such as additional air conditioning, pneumatic tube systems, building power wiring, the addition of a raised floor for a

computer complex, and fire protection equipment.

The Contractor assumes responsibility for the procurement of all items under the first four categories and assumes that the Air Force will handle the procurement of standard essential parts and items for facility modifications in the normal manner. However, the Contractor will supply performance specifications for the facility modifications.

1. Equipment Not Commercially Available

The equipment that is not commercially available will be procured as shown in Figure 11 Flow Diagram-Equipment Not Commercially Available. As part of the Phase 2 effort, performance specifications have been prepared. These specifications are being sent to applicable vendors. Based on proposals received and vendor conferences, mutually agreeable equipment procurement specifications will be prepared. After evaluation of proposals based on these specifications and after informal Air Force approval, orders will be placed for the applicable equipments.

The Contractor will follow closely the design and manufacture of the applicable equipments at the vendors' plants by frequent visits and meetings with engineering personnel at the vendors' facilities. If the vendor has an Air Force plant representative, then both the Air Force representative and the Contractor will witness the final equipment tests. It is desirable to have detailed testing at the vendors' facility because of the diversity and small quantities of equipment in the Subsystem which will not justify the expense of special test equipment. Upon successful completion of the tests at the vendors' plants certain equipments will be packaged for commercial shipment and shipped to the Contractor's facility for integration with other equipments and will be tested for compatibility and performance. Equipments which have passed acceptance tests at the Contractor's facility will be shipped directly to the site for installation.

2. Equipment Commercially Available

The equipment that is commercially available will be procured as shown in Figure 12, Flow Diagram - Equipment Commercially Available. After Air Force approval of the equipment lists, the Contractor will place orders for the various equipments. These items will be packaged for commercial shipment and shipped to the Contractor for inspection and test and then sent to the site for installation. Items may be shipped directly to the site for installation provided prior informal Air Force approval has been obtained.

3. Leased Equipment

Leased equipment will be procured as shown in Figure 13, Flow Diagram - Leased Equipment. Based on the equipment lists and specifications, an order will be placed for the equipments. The Contractor will inspect the design and manufacture of the equipments by frequent visits and meetings with engineering personnel at the lessor's facility. Both the Air Force and the Contractor will witness the equipment checkout and equipment tests at the lessor's facility. After successful completion of the tests, the equipments will be shipped by commercial padded van to the site, installed, and checked-out. The Contractor will continue his leasing agreement with the lessor until the overall Subsystem tests are completed, and the Air Force has taken over the operation of the equipments.

4. Special Essential Parts

The special essential parts will be procured exactly as the commercially available equipment.

5. Standard Essential Parts

The GFE Communications Equipment is described in Volume Two, Part II, Section V-D-4.

6. Items for Facility Modifications

The following list of items is required for the facility modifications and will not be supplied by the Contractor.

Number	Item	Specification - Paragraph
1	Additional air conditioning	II-D-3, 4
2	Fire detection and extinguishing systems	II-D-6
3	Raised floors	II-D-7 (a)
4	Conveyor	II-D-7 (f)
5	Pneumatic tubes	II-D-7 (g)
6	Ancillary facilities	II-E
7	Tempered water system	II-D-7 (h)
8	Phone systems	II-D-7 (i)
9	Stand-by power	II-F-1, 2

Number	Item	Specification - Paragraph
10	Additional electrical power	II-D-1
11	Emergency lighting	II-F-3

Also included under these items will be building modifications and other items not specifically included in the equipment lists.

7. Transportation and Materials Handling Equipment

No special transportation or materials handling equipment is required.

C. Cable Requirements

The basic primary electrical power requirements are delineated in Section II-F following. Two separate power distribution systems are employed; one handles the power for the computer equipment, and the second handles the power for the special air conditioning equipment which cools the computer equipment. Each system is fed by its own distribution transformer and control panels.

At Site A, commercial power will be delivered at 23,000 volts. At Site B, an intermediate voltage distribution system currently exists. For both sites the voltage will be reduced by suitable transformers so that the line voltage actually delivered to the computer equipment will be 208 volts (± 8 percent), 3-phase, 4-wire.

Figure 15, Power Distribution Diagram, Computer Equipment, Site A, is a single line power distribution diagram for the computer equipment at Site A. The same diagram will apply for the computer equipment in Site B with the exception that a fewer number of storage units and fewer number of storage control units will be employed.

D. Building Specifications

1. General

The space requirements for personnel were derived from the Manning Tables,

in the Appendix, the organization model, and the personnel space allocation schedule as given below:

Personnel Space Allocation Schedule

Rank/Grade	Square Feet
General Officers and GS16	400
Colonels and GS15	200
Lt. Colonels to Lieutenant and GS14 to GS8	100
M/Sgt. to A/1C and GS7 to GS5	80
A/2C to A/3C and GS4 to GS2	60

On a one shift basis there will be 629 people at Site A and 915 at Site B. It is estimated that 15 percent of these people will be women.

In addition to the office (Code 1) space required by these people, areas are required for files, storage, concessions, libraries, conference rooms, and processing space.

The breakdown of space according to code numbers is given below:

Code	1	2	3	4	5	6	10	Total
Site A	90,102	3050	3220	2228	255	7703	21,419	127,977
Site B	63,140		1200	320		2783	12,748	80,191
Grand Totals	153,242	3050	4420	2548	255	10,486	34,167	208,168

Areas requiring special consideration are shown in Figure 14, Site A and Site B Area Specifications, Equipment Electrical Input and Heat Dissipation.

2. Maintenance Floor Space

Since the Consolidated Subsystem is being installed in existing buildings, it is assumed that the building maintenance floor spaces at both Sites A and B are adequate for the Subsystem areas.

The equipment areas include maintenance rooms which will provide working

space for equipment repairs as well as space for test equipment.

3. Air Conditioning - General

The buildings at both sites are already air conditioned and it is assumed that the air conditioning (heating as well as cooling) is adequate for the Consolidated Subsystem space and personnel at both Sites A and B, although air ducts and radiators may be relocated at the discretion of the architects. Additional air conditioning must be provided at both sites to offset the heat dissipated by the equipment.

4. Air Conditioning Specifications

a. Air conditioning specifications for personnel and space will be 75F unless otherwise stated.

b. Special air conditioning specifications (Computer Complex, Document Handling, Storage, and Retrieval, Photo Interpretation Area, Film and Magnetic Tape Storage.)

(1) Temperature and Humidity Limits

(a) Non-operating - No power on the equipment

Temperature	50 to 110F
Relative Humidity	20 to 80%

The room must be conditioned to meet the operational requirements before the machine is turned on. In addition, acetate film must be stored under conditions specified for operational conditions.

(b) Operational Power on the equipment Site A

	Computer Complex	Document Retrieval Area	Photo Interpretation Area
Temperature	50 to 80F	65 to 75F	70 to 75F
Relative Humidity	20 to 80%	40 to 60%	40 to 60%

(2) Temperature and Humidity Design Conditions

	Summer	Winter
Dry Bulb	75F	70F
Wet Bulb	63F	58F
Relative Humidity	50%	50%

(3) Dust

A high efficiency type filter will be installed to filter all supplied air. This filter will be rated at least 40 percent efficient by the Bureau of Standards discoloration test using atmospheric dust.

(4) Capacity

The air conditioning requirements for the system are listed below. These estimates include the equipment loads but do not include lighting, building radiation, transmission, or leakage losses. The present building air conditioning is presumed adequate for these losses.

LOCATION	TONS	TOTALS
Site B		
Computer and Display Complexes	25	25
Site A		
Computer Complex	126.9	
Document Handling and Processing	24.7	
Communications Area	12.5	164.1

(5) The special air conditioning systems assuming an adequate supply of make-up or chilled water and electrical power, will be designed to meet the following reliability requirements:

(a) Site A - Assuming an adequate supply of electrical power and make-up water, the air conditioning system will operate within the limits specified in 4-b-(1)-(b) above, 24 hours a day, five days a week, 52 weeks a year with an up-time of at least 99.98 percent. Preventative maintenance is to be performed during week-ends.

(b) Site B - Assuming an adequate supply of power and chilled water, the air conditioning system will operate with the limits specified in 4-b-(1)-(b) above,

24 hours a day, 365 days a year with an up time of at least 99.99 percent.

(6) Controls

(a) Recording instruments are to be installed in the humidity controlled areas. These instruments will provide a continuous record of temperature and humidity. These instruments will indicate not only if the conditions deviate from the specifications but also the duration of deviations. The instrument is to be a direct reading seven-day electric drive type and so located that it will measure air conditions entering the machine. A visual or audible indication will be evident if the temperature or humidity conditions are beyond specifications.

(b) A separate under-the-floor warning system will be incorporated in the Computer Complex to indicate a separate alarm as in (6) (a) above in the event that the air flow falls below a preset level or if the temperature of the chilled water rises above a present value.

(c) All electrical power for the air conditioning equipment will be on a separate transformer bank.

(d) Emergency (panic) buttons will be located in the machine room which will shut off power to the air conditioning as well as the machines. In addition, the power to the air conditioning system must be controlled from the machine room.

5. Cable Entrance Requirements, Cable Terminations, and Cable Routing

This information is not available at the present time. Line power cable routing and power transformer locations for the reduction from 2300 volts to 208 volts is pending. The 208-volt power transformers will be mounted inside the building.

6. Fire Detection and Extinguishing Systems Specifications

a. Fire Detection

The primary purpose and the intended use of a fire detection system is to trigger an alarm at a continually manned fire guard station. The main type of detection systems available are:

(1) Thermal,

(2) Smoke, and

(3) Incipient.

An incipient electronic detection system will be used. It is designed to detect a fire before smoke or heat is emitted. This detection system is actuated by the presence of invisible combustible gases emitted before a fire actually starts. An instantaneous fire detection method showing the exact location of a fire is of prime importance.

Using an incipient electronic fire detection system, the requirements are as follows:

(1) Installation of fire dectector control panels near the manned fire guard station in the building.

(2) Manned fire guard station to be located next to the electrical power distribution panels for the entire building.

(3) Fire detection system to emit two types of warning signals:

  (a) Visible flashing red light, and

  (b) Audible siren signal.

(4) "On-Line" and "Off-Line" equipment areas, laboratories, vaults, and special display areas will be heavily protected.

(5) The office rooms and halls will use an average (medium) amount of protection.

(6) The fire detection system is to have an adequate number of detector devices. Each detector device (in most cases ceiling mounted) will be mounted on the lowest part of a non-uniform ceiling to ensure the maximum protection.

(7) As there is no "yard stick measure" as to the number of square feet covered by each detector device, the total number of detector devices used in each Computer Complex will be governed by:

(a) Utilization of area; degree and amount of heavy and medium protection used,

(b) Military classification of the area, and

(c) Room partitioning.

(8) When using a large number of detector devices, individual circuits will be provided. The number of individual circuits per fire detection system will be determined by:

(a) Total number of detector devices used,

(b) Current loading per circuit,

(c) Physical location of detector devices, and

(d) Systems plan to fire detection control panel.

(9) The fire detection systems will not automatically control the operation of the fire extinguishing systems.

(10) Hallways, latrines, spaces between false floors and false ceilings will be protected.

b. Fire Extinguishing Systems

Fire extinguishing system types are:

(1) Water Sprinkler Systems;

(a) Wet pipe system,

(b) Dry pipe system,

(c) Deluge pipe system,

(d) Pre-action pipe system, and

(e) Dry pipe and pre-action combination system;

(2) Wet Chemical Systems;

(a) Carbon dioxide system,

(b) Soda-acid system, and

(c) Foam system,

(3) Dry Chemical Systems;

Powder spray system (many types).

The water sprinkler and wet chemical fire extinguishing systems used in a computer complex to protect against fire hazards will have manual control for initial operation, unless otherwise stated.

(1) Fire extinguishing systems will protect a combustible type building housing a computer complex. These buildings will use a water sprinkler system, dry pipe and pre-action pipe combination system.

(2) Fire extinguishing system will protect a non-combustible type building housing a computer complex. The building will use a wet chemical system, carbon dioxide system.

(3) Fire extinguishing systems will protect the equipment used in a computer complex. A wet chemical carbon dioxide system type will be used.

If the present combustible building is allocated to house the Computer Complex, the existing water sprinkler system (wet pipe type) will be converted to a dry pipe and pre-action combination system. In this application water will be removed from the pipes located in the equipment rooms and will be replaced by air under pressure. The present water sprinkler heads are to be removed and replaced with high-temperature heads that will automatically open at a higher pre-set level and sound an alarm. But the water supply into this system will be controlled manually. Water will be applied to the system for sprinkler operation only on occasions of extreme emergency.

Wet chemical fire extinguishing systems (in this manual) shall all employ the use of carbon dioxide. Carbon dioxide is a colorless, odorless, electrically non-conductive inert gas that extinguishes fires by reducting the concentration of oxygen to a point where combustion stops. The types of carbon dioxide fire extinghishing systems are:

(1) Total room flooding system,

(2) Local applications system,

(3) Extended discharge system,

(4) Hand hose line system, and

(5) Stand pipe system with mobile supply.

Local applications systems using carbon dioxide will be used for computer equipment fire extinguishing. This system will consist of 20-pound portable wall-mounted tanks. Said tanks will be placed adequately throughout the Computer Complex area. Equipment areas, laboratories, vaults and display areas will have a heavy amount of protection; offices, halls, etc., will have a medium amount of protection. The total number of portable carbon dioxide tanks used to protect the complete Computer Complex will be a function of the degree and amount of protection required.

The most desirable system is the extended discharge system. It is a fixed supply of carbon dioxide under pressure to a system of piping arranged to discharge at an initial high rate followed by an extended discharge at a lower rate for the total flooding of the inside area of each and/or specific equipment cabinets. Further protection of the equipments and the building may be provided by the addition of hand hose lines to this type of system. This type of fire extinguishing system controls both surface and deep-seated equipment fires. It was thoroughly investigated but was not recommended for use because:

(1) Space constraints in the present buildings assigned to house the Computer Complex and associated fire extinguishing equipment, and

(2) Present combustible buildings have water sprinkler systems previously installed and will be used to protect the building.

7. Special Requirements

a. Raised Floors

The floors of both Computer Complexes are to be raised 14 inches above the building floor to provide space for interconnecting cables and to act as a plenum chamber for the cooling air supplied to the computer units. The raised floor may be a minimum of 8 inches above the building floor where it is necessary to get more clearance to the ceiling. This floor must be capable of supporting

100 pounds per square foot and a caster load of 1000 pounds.

b. False Ceilings

False ceilings are recommended in the Computer Complex areas to conceal the ducts returning the warm air to the air conditioner.

c. Electrical Power

The equipment in the Computer Complex must be operated from a transformer that is not used for any other equipment. The power will be supplied by a 208-volt ± 8 percent, three-phase, four-wire system. All three line-to-line voltages will be balanced within 2 percent during normal running time. The power frequency will be 60 cycles ± 1/2 cycle.

d. Illumination

A minimum average illumination of 40 foot-candles, measured 30 inches above the floor, will be maintained in the Computer Complex areas. The lighting will be sectionally controlled by switches so that several levels of illumination can be obtained in areas within the Computer Complex areas. The level of illumination in other work areas will meet the illumination standards set for that category of work performed in each particular area.

e. Area Cleanliness

Dust and dirt can be an endless source of trouble in the processing and the computer areas. Care must be taken in selection of floor, ceiling, and wall materials to keep these materials from being a source of dust and dirt in themselves.

f. Conveyor at Site A

A conveyor will be provided at Site A to deliver documents from the processing and main distribution areas to each major room of the edit-coding branch. The conveyor must be enclosed, quiet in operation, and have a speed of 100 feet per minute. The documents will be carried in trays approximately 12 inches by 18 inches by 6 inches deep. The dispatching station will code the trays for delivery to any subsequent station. Loading of the conveyor will be at the rate of 5 to 10 trays per minute. The conveyor will be wall mounted and extend no more than two feet into the room.

g. Pneumatic Tube Systems

(1) Two separate pneumatic tube systems are required at Site A. A tube system will be employed with 14 stations as shown functionally in Volume Two, Part 2, Section V-D. This is a 4-inch by 7-inch system. Its carriers will have actual inside dimensions of 5 and 5/8 inches deep by 2 and 7/16 inches wide with rounded corners and an inside length of 14 and 1/8 inches. The system will be provided with an automatic switching center which permits sending a carrier between any two stations. The system will operate completely unattended 24 hours a day. The system will have a reliability of one failure in 1000 hours of operation assuming adequate maintenance and proper operation. A failure includes a carrier being sent to an incorrect station. The noise level of the system will be held to a minimum so that the tubing and stations can be located in office areas. The power to the equipment must be 208 volts, three-phase, and all motors must include overload protection. The supplier of this system must supervise the installation of the equipment although the building cutting and patching will be done by others. Power will be provided up to the circuit breaker panel adjacent to the switching center. Therefore, the Contractor must include wiring from the circuit breaker panel to his switching. Individual outlets will be provided near each tube station for 120-volt, single-phase power.

A second pneumatic tube system is required at Site A which has the same performance specifications as the 4-inch by 7-inch system with the following exceptions:

(a) The size of the carrier is different. It will be a 4-inch diameter system with an internal carrier diameter of 2-7/8 inches and an inside length of 14-1/8 inches minimum.

(b) The number of stations required will be four and there will be no automatic switching center.

(c) The tubes will go from one area which will have direct connection to three other areas located throughout the same building as shown in Volume Two, Part 2, Section V-D.

(2) Two pneumatic tube systems similar to the 4-inch system specified for Site A will be required at Site B.

The first pneumatic tube system employs 7 stations with connections as shown functionally in Volume Two, Part 2, Section V-D. No automatic switching stations are required. All tubes run point-to-point as shown. A portion of this system has already been installed at Site B. Tube and carrier sizes are to be identical with those described for the 4-inch system at Site A.

The second pneumatic tube system will employ 2 stations, one in the vicinity of the operator's console in the IBM 7090 room in the basement, and the other in the projection room area of Room W in the basement. Both of these stations are contained within the same vaulted area.

h. Tempered Water Supply at Site A

A tempered water supply is required in the photographic laboratory associated with the Photo Interpretation Branch. The equipment, to provide water at 68F ± 2F, will have a 5-ton water chiller to cool incoming warm water, and a heating element to warm the incoming water in case it is lower than the desired temperature.

i. Telephone Systems

The allocation of standard telephones for the transmission of unclassified information will be made according to accepted standards. The functional allocation of secure telephones and communications equipment is shown in Volume Two, Part 2, Section V-D.

j. Floor Vibration

While sensitive photographic equipment will be provided with vibration mountings, the floors in the photographic areas must be free of repeated sharp vibrations.

k. Document Handling Darkroom

The darkroom equipment will be installed in a separate space fulfilling the following recommendations:

Type - Darkroom - no windows, light-tight entrance.

Temperature - 70F ± 5F, 50 percent ± 18 percent R. H.

Ventilation - The incoming fresh air will pass through suitable filters to remove all dust particles. The air flow will be sufficient in volume to change the air in the darkroom six to ten times an hour. The processing room will be maintained at a positive pressure, greater than any adjoining room. Air will be forced into the processing room rather than out.

Electric Power - 220 and 110 single-phase 60 cycle 30 ampere circuits.

Water - Hot Water, 130F minimum, 5 gal/min.
Cold Water, 60F maximum, 5 gal/min.

Processor Exhaust - Optional, to hold room temperature if heaters are used in dry cabinet.

Lights - Ceiling type - Wratten IA safelights for darkroom operation.

Floor Covering - Recommended floor covering is an asphalt tile in a pleasing color.

Walls and Ceiling - Walls will be painted with a semi-gloss paint, preferably a pleasing light shade in the spectral range of the safelights, such as coral. Recommended ceiling color is semi-gloss white.

Plumbing - Water supply lines will be of copper or brass pipe. Drain pipes will be 3-inch, 18-8 Molybdenum stainless steel, A.I.S.I. type 316.

Benches - A dry bench of a minimum size of 3 feet high, 4 feet long and 24 inches wide is recommended. Bench top will be covered with heat and stain resistant formica type material.

8. Water Supply

a. Personnel and Equipment Needs

Site A and Site B, the proposed sites for the installation of the Computer Complexes, presently have water supplied to the buildings, but it is not known at this time if the water systems of each site can furnish an adequate supply of water needed by the addition of personnel and equipments supporting the Computer Complexes.

Factors governing water consumption in a given location are geographical location, size of population, domestic areas, commercial and industrial areas, and efficiency of water systems.

The quantity of water required for commercial and industrial use and associated personnel has been related to floor area of the buildings being served. It has been estimated that the average daily consumption of water per 100 square feet of floor area averaged 30 gallons per day.

b. Fire Fighting and Protection Requirements

Although the actual amount of water used in a year for fire fighting is small, the rate of use while actually fighting a fire is large. The National Board of Fire Underwriters uses the following formula:

$$G = 1020\sqrt{P}\ (1-0.01\sqrt{P})$$

Where G = fire flow in gpm (gallons per minute) and must be maintained for a given minimum amount of hours, i.e., 10 hrs.

P = population in thousands

c. It is planned that air conditioning systems using evaporative condensers or cooling towers will be used so that the water make-up will not exceed 0.10 gpm per ton of air conditioning for each 85 ppm of hardness in the water.

d. Special equipment rooms, such as photographing laboratories, require a water flow of 10 gpm.

e. Estimated total water flow in gpm per site:

Site A

26 gpm	300 gallons per day/1000 square feet
17 gpm	0.10 gpm/ton of air conditioning
10 gpm	per special room requirements
53 gpm	TOTAL

Site B

16 gpm	300 gallons per day/1000 square feet
3 gpm	per 0.10 gpm/ton of air conditioning
5 gpm	special equipment rooms
24 gpm	TOTAL

f. Sewage and Industrial Waste

The average rate of sewage flow, including a normal amount for infiltration and commercial use, equals the average rate of water consumption for the building.

9. Security Requirements

The Security requirements for Site A require a lighted perimeter chain link fence with a guard station at the entrance. This fence will be at least 8 feet high and will be topped by at least 3 strands of barbed wire. The vaulted area within the building requires expanded metal grills on all external windows on the first floor. These metal grills must be locked and sealed from the inside but must have provisions for opening in case of fire. The vaulted area must have a guard/receptionist at each entrance. Each entrance will have a controlled turnstile. When the area is closed, a 3 combination lock is required on each door. For small vaulted areas, guard inspection ports must be included. Detailed security requirements cannot be decided until more is known concerning the site.

E. Ancillary Facilities, Fire Vault near Site A

It is recommended that the vault for storage of the film originals and magnetic tape duplicates be located in another or separate building far enough from Site A to be safe from destruction in event of a fire in Site A. This vault will provide storage capacity for both Site A and Site B complexes.

F. Power Consumption

The Consolidated Subsystem equipment uses an electrical input of 814.5 KVA at Site A, and 309.5 KVA at Site B of 3 phase 60 cycle electrical input. Special requirements for power in the Computer Complex

area are given in Section II-D-9-c. A breakdown of electrical input is as follows:

Site A

	KVA
Document Handling, Storage, and Retrieval Area	98.44
On-Line Equipment Area	444.90
Off-Line Equipment Area	21.20
Communications Area	50.00
Computer Equipment Air Conditioning System	200.00
Total	814.54 KVA

Site B

	KVA
Staff Offices	2.40
Area 0	11.95
Room W	22.80
Room A	24.65
Room S	23.00
On-Line Equipment Area	183.10
Off-Line Equipment Area	11.60
Computer Equipment Air Conditioning System	30.00
Total	309.50 KVA

G. Accessories or Related Facilities

1. Site A Preliminary Specifications for Stand-by Electrical Power

a. Two separate gas or diesel driven generators will be provided to supply the stand-by power, with the following specifications:

(1) Power,

Generator Number 1 - 750 KVA
Generator Number 2 - 200 KVA

(2) Voltage,

The output voltage for both generators will be 208 volts, three-phase, four-wire. The line-to-line voltage will be 208 volts ± 8 percent for normal operation. All three line-to-line voltages will remain balanced to within 2 percent during normal running time.

(3) Frequency,

The output line frequency will be 60 $\pm$ 1/2 cycles per second.

b. The stand-by equipment will be housed at an altitude between 0 and 500 feet above sea level. The housing for the stand-by generators will be in a shed protected from the elements. Sufficient ventilation of this power shed must be provided to accommodate radiator cooling of the generators.

c. In the event of a primary power failure, the stand-by power equipment will start automatically. An electrical battery charging system will be supplied to keep the starting batteries of the generators fully charged at all times.

d. The stand-by power will be transferred manually to and from the line. A manual stand-by power transfer control panel for the stand-by generators, located in the computer on-line equipment room, will be provided. This stand-by power transfer control panel will include:

(1) Indicator light located on front of the control panel to indicate when stand-by power is ready and available for application,

(2) A voltmeter, with three position switch, to monitor the three-phase voltage outputs, and

(3) Push-button type circuit breaker switches.

e. The stand-by power generators, both computer and air conditioning, will have similar, but separate, control panels.

f. The physical location of both the computer and air conditioning equipment stand-by power control panels will be in the computer on-line equipment room adjacent to the primary power distribution control panels.

g. The equipment must operate in an ambient temperature range between 0 and 110F.

h. The equipment is to have a high degree of silencing.

2. Site B Preliminary Specifications for Stand-by Electrical Power

Provisions for stand-by power at this site have been made previously for the existing machine equipment areas. The existing stand-by generators are located in the basement.

However, it is not known at this time if the total rated power output of the present stand-by generators will support the additional Computer Complex and air conditioning equipment power loading requirements of the proposed complete Computer Complex system to be installed in the basement of this site. Should the total rated power requirements of the existing stand-by power generators be inadequate, two separate stand-by generators will be required. One stand-by generator is needed to supply the power to the Computer Complex equipment; the other stand-by generator is needed to supply the power to the Computer Complex air conditioning system.

Assuming additional stand-by power generators will be required, the power specifications will be similar to those of Site A, step 1, listed under G, Accessories or Related Facilities, with the following exceptions:

a. Two separate gas or diesel driven generators will be provided for the stand-by power, with the following specifications:

(1) Power,

Generator Number 1 - 350 KVA
Generator Number 2 - 30 KVA

b. The stand-by equipment will be housed at an altitude between 0 and 500 feet above sea level. The housing for the stand-by generators will be in the basement of Site B. Sufficient ventilation of this basement area must be provided to accommodate radiator cooling of the generators. Exhaust fumes of the generators will be adequately vented to the outside of the building.

3. Preliminary Specifications for Interior Emergency Lighting Systems

a. An emergency battery operated lighting system is recommended in the critical areas of a computer complex that houses on-line and off-line equipments, document storage, vaults, and special display areas.

b. The emergency lighting system, when it is in operation, will be completely independent of the commercial power supply.

c. The emergency lighting systems will operate automatically and instantaneously upon the failure of commercial power.

d. A system of emergency lighting will be composed of an adequate number of individual wall mounted units. The number of separate units required will depend on the degree of emergency lighting desired and the area each unit is to illuminate.

e. Individual lighting units providing light emission of 180 degrees, rated at 50 watts, will contain:

(1) Automatic battery charging equipment that will operate from 120 volts AC, 60-cycle source (standard convenience outlet).

(2) Provision for manual operation of each unit.

(3) A wet cell battery, preferably nickel-cadmium type.

(4) Two adjustable directional flood lights.

f. When using a large number of individual emergency lighting units, lighting circuits will be provided by the addition of emergency lighting control panels. These circuits will be adequately fused and will have an alarm to indicate fuse failure.

g. Exits in all areas using emergency lighting will have emergency lighting exit sign fixtures incorporated. These exit fixtures will also illuminate the exit area.

III. INSTALLATION ENGINEERING

This section contains the information required to enable installation engineering personnel to complete the pre-installation engineering necessary to adapt the facilities to the system.

A. Siting

The following information is necessary in determining the proper site selections. A portion of the man-machine system is located at Site B but, due to space constraints, the remaining system must be located at a second site within 60 minutes traveling time by car from Site B. This second site (Site A) must have a reliable source of electrical power and drinking water. It must be near and have access to a main arterial highway. The site must have good drainage and be free from danger of flooding. It must also have adequate telephone communications.

It is preferable to select a site on Government owned or controlled property. However, if an off-base site is required, allowance should be made during preparation of the site-concurrence letter for subsequent action by the real estate acquisition activity. For example, when recommendations are made for tree cutting, pole setting, obstruction and building removal, zoning agreements, and construction of drainage systems, roadways, and other related facilities, the responsibility of the air installations officer for obtaining licenses, permits and agreements should not be overlooked.

No site survey for Site A is presently contemplated since a portion of an existing building is available and generally meets the site requirements. If a new site is to be used, a site survey will be conducted in accordance with applicable regulations and technical orders.

B. Equipment Layouts

Equipment layouts are shown in the following figures:

Figure 16 Pictorial Index of Equipment Location Drawings for Site A Basement

Figure 17 Equipment Locations, Tape Conversion Area, Site A

C. Building Modifications

The modifications to existing buildings will be done one area at a time because of the difference in timing of the equipment delivery and also because the disruption of the existing system must be kept at a minimum. Flow diagrams showing the steps required to modify the existing building areas are shown in Figures 31 and 32, Flow Diagrams, Building Modifications for Sites A and B.

1. Site A

As shown in Figure 31, Flow Diagram, Building Modifications, Site A, the Contractor will provide specifications to the Air Force which upon program approval, will be implemented by the Headquarters Command, Bolling Air Force Base. The Air Force may elect to have the Post Engineer at Site A be the Project Engineer for the modifications or they may elect to retain this authority. It is, however, recommended that the existing project for

modification of wing 5 of Site A (Project No. BOL 155-9 Assigned 24 June 1959) be amended to include the additional modifications required of this program. Based on the Installation Instructions and approved floor plans, the architect will prepare detailed plans. Close liaison will be maintained with the Air Force while these specifications are in process and these specifications will be informally approved by the Air Force. Bids will be solicited from reputable building contractors to perform the work per these approved specifications, and the Contractor and architect will assist in the evaluation of these bids and recommend minor changes in the specifications if they will result in a lower cost without reducing system performance. Contracts will be awarded to various building contractors for the building modifications, and the Contractor and architect will assist in the supervision of these modifications. The Contractor will have a resident engineer at each site for this purpose.

2. Site B

As shown in Figure 32, Flow Diagram, Building Modifications, Site B, the flow is similar for Site B except that the work will be handled by the Staff Services Division.

IV. INSTALLATION PROCEDURES

A. Purpose and Scope

This section lists the required information for the installation of equipment and support items for the sites covered in this handbook, and testing required to make the sites fully operational. This section includes the installation of all equipments listed in Section II Figures 3 through 10 and the testing of the building modifications specified in Section II. As much of the testing as possible will be done prior to the equipment installation so that the overall program will not be delayed.

B. Tools and Test Equipment

This subsection lists all tools and test equipment required to test the installation. Note that this does not include the testing of the equipment itself, but rather the inputs, and the environment in which the system will operate.

The air conditioning subcontractor will test the special air conditioning prior to equipment installation. However, this is under "no load" conditions, and additional testing and balancing will be required before the installation can be considered satisfactory and the maintenance of the air conditioning turned over to the local maintenance personnel. The use of a velocity meter and thermometers by Contractor's personnel at this time is desirable to find localized hot spots and to initiate corrective action. The use of the remaining equipment is mandatory for trouble shooting the system even though the electrical subcontractor will check out all of his work. For example, if a circuit breaker opens repeatedly, the failure may be due to a defective breaker or a current overload on the line. A clamp-on ammeter can be used to resolve the problem in several minutes.

C. Facility Modification and Installation Phasing

This subsection describes the time phasing and procedures for the facility modifications required for the system.

1. Time Phasing

The installation time phasing is described for Sites A and B, and the schedule is shown in Figure 34, Installation Phasing Schedule. Additional information is provided in Volume Four, Section II.

a. Site B

For the basement, an area decision must be made by the 4th month, and the area must be available for modification by the 8th month. The space required is 14,429 square feet.

Rooms S and A are located adjacent to one another. Their modifications are time staggered to provide the smoothest possible transition by allowing personnel from the two other areas at Site B to occupy Room S when these areas are being modified. The major equipment will not be installed in Room S until the 15th month.

b. Site A

For Site A, an existing building has been assumed as a typical site. When modifying an existing building it is desirable to seal off the areas in which the building contractor personnel are working. Therefore, ideally, the entire basement area will be cleared of people for a four-month period for building modifications. Certain areas in the basement contain only personnel, and the modifications to these areas can be completed in four to eight weeks and may be used by personnel. This basement area contains 45,000 square feet and must be made available for modification during the 8th month. The facility must be designed for full capability. However, 2,000 square feet of computer space is not required initially and will be available from the 22nd through the 25th months for training and testing.

The addition of the Hard Copy Library, and the Map, Chart, and Photo Libraries, and the rearrangement of offices can wait until the building modifications are complete, and personnel can be moved into the basement areas.

D. Facility Installation Testing

The primary purpose of a building facility installation systems check is to test and/or check thoroughly all building facility requirements pertain-

ing to the installation prior to this initial equipment installation. The equipment testing is not a part of this specification. All building facility specifications and requirements set forth by the prime contractor must be met satisfactorily by the subcontractors or the installation activity.

Preliminary specifications for facility testing and/or checking will include, but will not be limited to the following:

1. Internal and external electrical power wiring and control distribution panels:

   a. Fusing and circuit breakers,

   b. Lightning protector circuitry,

   c. Electrical grounding throughout the building and all power wiring circuitry,

   d. Voltage output to equipment:

      (1) 208 volts, three-phase, four-wire,

      (2) Frequency of 60 $\pm$ 1/2 cycles per second,

      (3) Voltage shall be 208 volts, $\pm$ 8 percent,

      (4) All three line-to-line voltages will be balanced to within 2 percent during machine operating time,

      (5) Correct phase rotation of three-phase power inputs.

2. Lighting Systems:

   a. Commercial lighting system,

   b. Emergency lighting system operation.

3. Air Conditioning System for Equipment Areas:

   a. Temperature,

b. Relative humidity,

c. Cubic feet of flow per minute,

d. Complete number of air changes per hour,

e. Filter system,

f. Cooling system,

g. Automatic warning circuitry.

4. Fire Detection and Prevention Systems:

a. Operation of detector warning control panels,

b. Operation of fire extinguishing system with manual or automatic control.

5. Emergency or Stand-by Power:

a. 208-Volt, three-phase, four-wire,

b. Line frequency of 60 ± 1/2 cycles per second,

c. Voltage output shall be 208 Volts ± 8 percent,

d. All three line-to-line voltages will remain balanced to within 2 percent during running time,

e. Correct phase rotation of three-phase power inputs,

f. Operation of the stand-by power switching control panel, including manual power transfer to and from the line,

g. Time required for generators to stabilize and deliver maximum rated power to the line.

6. All construction inside or outside the building, i.e., rooms, walls, plumbing, false floors and ceilings, etc.

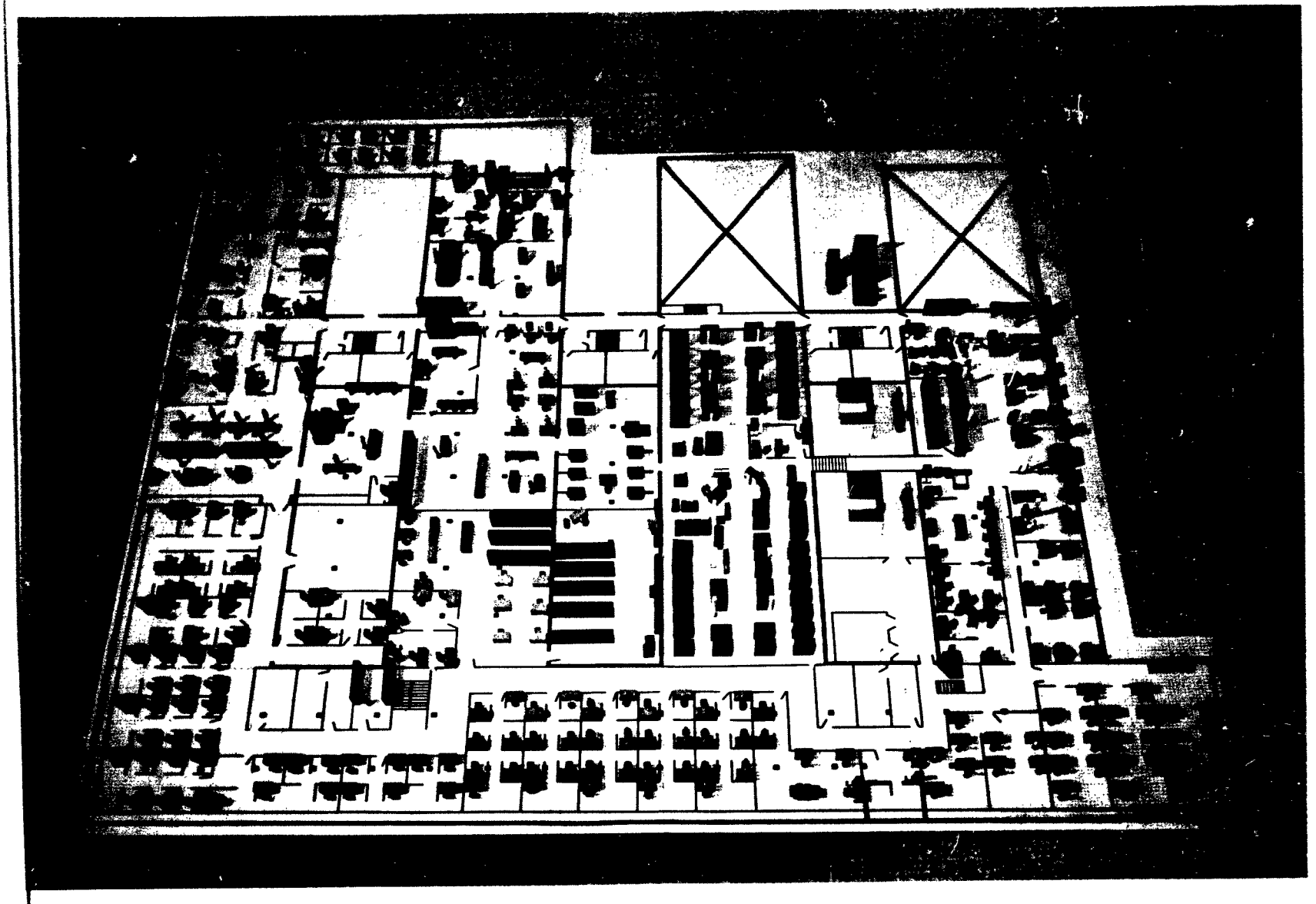


FIG. 1 VOL FIVE
SCALE MODEL OF BASEMENT AT SITE "A"

COMPUTER COMPLEX - ON LINE

NO.	EQUIPMENT	VENDOR	MODEL OR CAT. NO.	QUAN.	KVA	10^3 BTU/HR	WT. LBS.	L. IN.	W. IN.	H IN.	TOTAL KVA	TOTAL 10^3 BTU/HR	TOTAL WT. LBS.	LEASE 3 SHIFT K $	PURCHASE PRICE K $	LEAD TIME IN MONTHS
1.	CENTRAL PROCESSOR UNIT	IBM	7100	1	5.0	13.7	3,800	56	60	69	5.0	13.7	3,800	30.555	707.50	21
2.	CONSOLE CONTROL UNIT	IBM	7151	1	1.2	3.4	1,000	61	41	44	1.2	3.4	1,000	2.205	61.70	21
3.	POWER CONVERTER	IBM	7608A 7608B	1 1	1.9 -	5.1 -	2,000 1,200	61 56	29 30	58 69	1.9 -	5.1 -	3,200 -	2.880	60.00	21
4.	CORE STORAGE	IBM	7302	1	2.5	6.8	1,900	56	30	69	2.5	6.8	1,900	35.640	950.00	21
5.	MULTIPLEXOR	IBM	7606	1	2.5	6.8	1,900	56	30	69	2.5	6.8	1,900	7.020	156.30	21
6.	DATA CHANNEL ADAPTER	IBM	(L) * 7607-I	2	2.5	6.8	1,900	56	30	69	5.0	13.6	3,800	8.100	208.60	21
7.	DATA CHANNEL ADAPTER	IBM	(L) * 7607-II	2	2.5	6.8	1,900	56	30	69	5.0	13.6	3,800	6.300	169.90	21
8.	DATA CHANNEL ADAPTER	IBM	(L)* 7607-	4	2.5	6.8	1,900	56	30	69	10.0	27.2	7,600	8.100	208.4	21
9.	FILE CONTROL UNIT	IBM	(L)	13	1.5	5.1	2,000	56	30	69	19.5	66.3	26,000	9.000	210.0	21
10.	RANDOM ACCESS STORAGE UNIT	IBM	(L)	38	9.48	32.4	2,500	68	33	69	360.2	1231.3	95,000	4.50	125.0	21
11.	MAGNETIC TAPE UNIT	IBM	(L) 729-IV	8	1.8	3.9	1,200	34	29	69	14.4	31.2	9,600	1.620	48.50	21
12.	DIRECT DATA CONNECTION	IBM	-	1	2.0	4.0	NEG.	INCLUDED IN 7606, 7607 & 7100			2.0	4.0	NEG	2.16	60.00	21
13.	PAPER TAPE ADAPTER	IBM	(L) (E)	2	.3 (EST.)	.8 (EST.)	150 (EST.)	-	-	-	.6 (EST.)	1.6 (EST.)	300 (EST.)	1.000	50.00	21
14.	PAPER TAPE READER	FERRANTI	TR5	1	.1 (EST.)	.3 (EST.)	34	9	11.5	10	.1 (EST.)	.3 (EST.)	34	-	2.39	3
15.	PRINTER	IBM	(L) (B)	2	4.0 (EST.)		2,000 (EST.)	29	48	54	8.0 (EST.)		4,000 (EST.)			21
16.	CARD PUNCH & READER	IBM	(L) (C)	1	4.0 (EST.)	23.0 (EST.)	1,000 (EST.)	30	58	46	4.0 (EST.)	36.0 (EST.)	1,000 (EST.)	6.30	175.00	21
17.	INPUT - OUTPUT CONTROL DEVICE	IBM	(L) (A)	2	1.0 (EST.)		300 (EST.)	31	29	53	2.0 (EST.)		600 (EST.)			21
18.	PUNCHED PAPER TAPE READER	FERRANTI	TR7	1	1.0	2.6 (EST.)	300 (EST.)	20	28	52	1.0	2.6 (EST.)	300 (EST.)	-	9.50	5
19.	SPOOLERS (FOR TR5 PAPER TAPE READER)	FERRANTI	ALL	2	-	-	21	13	8	12	-	-	42	-	.36	3
	TOTALS										444.9	1465.5	163,876			

* INCLUDES ONE TEST UNIT/ADAPTER
(L) LEASED

COMPUTER COMPLEX - OFF LINE

1.	MAGNETIC TAPE CONVERTER	B/L	GS1133A (L)	1	1.8 (EST)	3.9 (EST)	1,200 (EST)	22 (EST)	22 (EST)	68 (EST)	1.8 (EST)	3.9 (EST)	1,200 (EST)	.900 [a]	30.0	6
2.	ELECTRO-PLOTTER	B/L	GS1059E (L) TYPE S	1	3.5	10.0	2,140	76	67	48	3.5	10.0	2,140	1.965 [b]	65.5	6
3.	UNIVERSAL READER	B/L[d]	OSCAR (L) GS1081D TYPE M-2	1	1.6	4.1	600 350	49 36	42 36	69 33	1.6	4.1	600 350	1.06425[c]	25.0	6
4.	SPECIAL DEVICES	IBM	- (L)											.200	4.20	3
5.	STAPLER	BOSTITCH	3D	1	.3	NEG.	250 (EST)	26 (EST)	23 (EST)	60 (EST)	.3	NEG.	250	-	.590 + TAX	3
6.	PAPER DETACHER	MOORE	313	1	.2	.7	425	50	32	40	.2	.7	425	NO	1.30	6
7.	ACCOUNTING MACHINE	IBM	(L) 407 A-1	1	1.8	5.5	3,286	73	31	51	1.8	5.5	3,286	1.60	42.00	6
8.	REPRODUCING PUNCH	IBM	(L) 519 MOD I	1	1.6	4.1	1,311	53	25	50	1.6	4.1	1,311	.270	6.55	6
9.	INTERPRETER	IBM	557 (L) MOD I	1	.5	1.2	834	43	30	46	.5	1.2	834	.330	9.40	5
10.	SORTER	IBM	83 (L)	2	.6	.9	500	63	20	47	1.2	1.8	1,000	.220	6.20	4
11.	COLLATOR	IBM	87 (L) MOD II	1	1.4	4.6	1,027	43	29	52	1.4	4.6	1,027	.430	12.70	10
12.	PRINTING CARD PUNCH	IBM	26 (L) MOD I	4	.4	.9	208	31	28	39	1.6	3.6	832	.120	3.20	4
13.	SYNCRO TYPE PAPER TAPE PUNCH	IBM RAND	SYNCRO TYPE	8	.6	2.0	75 (EST)	60	30	30	4.8	16.0	600 (EST)	.29292 EA.	5.27	-
14.	CARD PUNCH	IBM	10 (L)	1	.1	-	29	20	9	7	.1	-	29	.020	.60	4
15.	VERIFIER	IBM	56 (L)	2	.4	.9	222	31	28	39	.8	1.8	444	.100	2.40	4
	TOTALS										21.2	57.3	14,744			

(L) LEASED

NOTES:
a. For lease add $3,000 ea. for installation
b. For lease add $6,550 ea. for installation
c. For lease add $3,547.50 for installation
d. With GS1095 Projector and output to Model G ELECTROTYPER with 7 channels

FIG. 3 VOL FIVE
EQUIPMENT LIST, COMPUTER COMPLEX SITE "A"

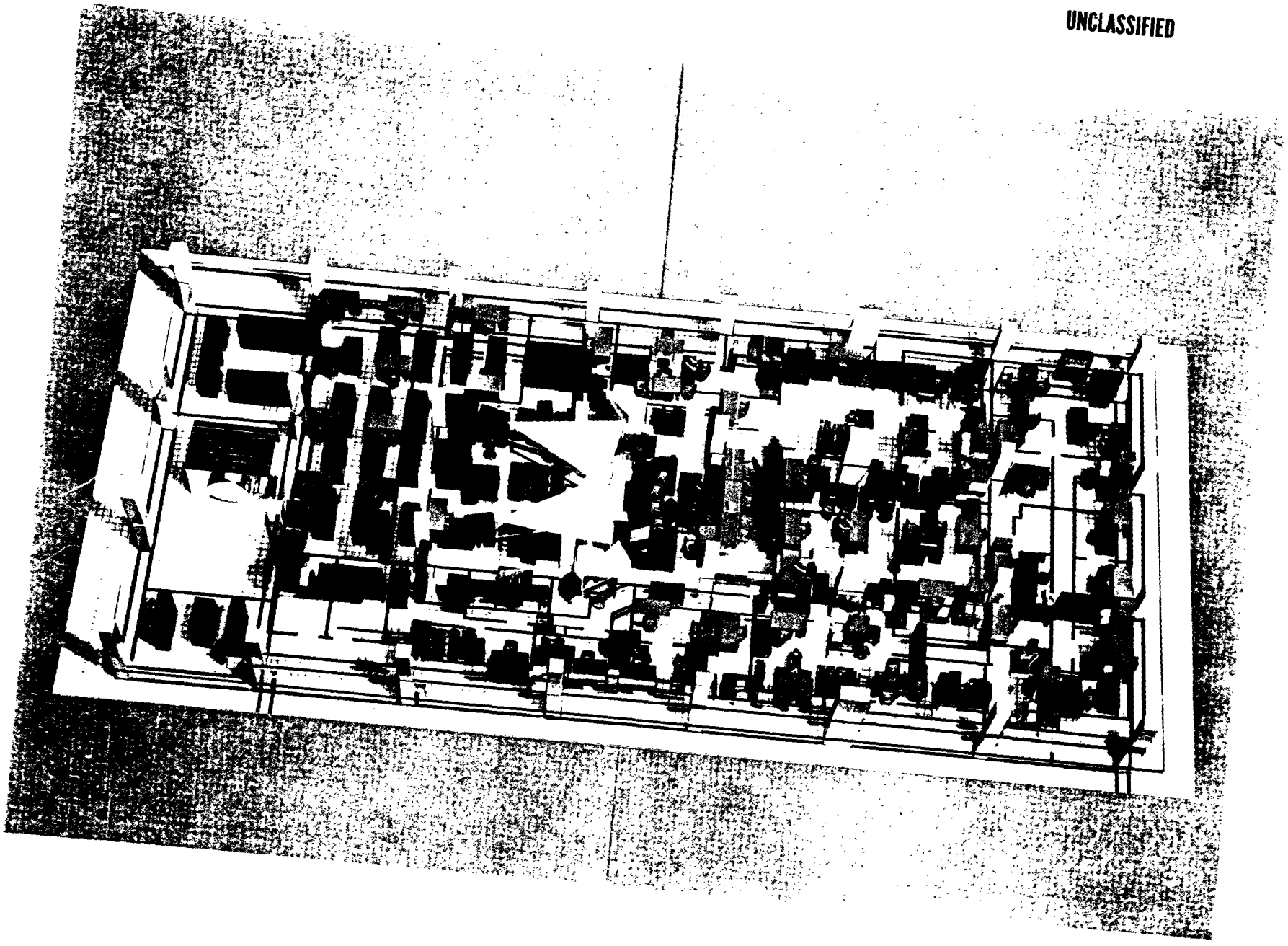


FIG. 2 VOL FIVE
DOUBLE-DECKED SCALE MODEL
OF BASEMENT AREA AT SITE "B"

DOCUMENT HANDLING AND RETRIEVAL

NO.	EQUIPMENT	VENDOR	MODEL OR CAT. NO.	QUAN.	KVA	10^3 BTU/HR	WT. LBS.	L IN.	W IN.	H IN.	TOTAL KVA	TOTAL 10^3 BTU/HR	PURCHASE PRICE K $	LEAD TIME IN MONTHS	TOTAL WT. LBS.
1	AUTOMATIC CAMERA	de FLOREZ CO.	-	1	7.5	10.0	3,500	96	42	96	7.5	10.0	146.0	12-18	3,500
2	FILM PROCESSOR	de FLOREZ CO.	1	1	2.4	8.50	700	84	24	48	2.4	8.50	5.0	12	700
3	FILM EDITORS	de FLOREZ CO.	-	2	0.6	2.00	40 (EST)	24	24	24	1.2	4.00		12	80 (EST)
4	MATRIX DUPLICATOR	AVCO/ BELL & HOWELL	-	1	7.2	2.5	800 (EST)	36	24	60	7.2	2.5			800 (EST)
5	MATRIX PROCESSOR	AVCO/ BELL & HOWELL	-	1	3.0	5.0	1,500 (EST)	108	48	60	3.0	5.0	100.0 (EST)	18	1,500 (EST)
6	DOCUMENT RETRIEVAL MACHINE	AVCO/ BELL & HOWELL	-	6 (EST)	3.0	10.0	1,000 (EST)	96	36	48	18.0	60.00			6,000 (EST)
7	ELECTROSTATIC PRINTER	A.B. DICK CO.	906	1	12.0	43.2	1,200 (EST)	96	30	50	12.0	43.20	196.0	18	1,200 (EST)
8	PRINTER BUFFER & CONTROL	G. E. CO.	G.E. 10,000	1	2.16	7.38	500 (EST)	60	26	78	2.16	7.38	233.0 (EST)	18	500 (EST)
9a	SYNCHROTAPE TYPEWRITER	REM. RAND	-	30	.6	2.05	150	60	30	30	18.0	61.50	3.270	2+	4,500
9b	SYNCHROTAPE TYPEWRITER	REM. RAND	-	23+3	.6	2.05	150	60	30	30	13.8	47.20	2.376	2+	3,900
10	MATRIX PLATE EDITOR	BELL & HOWELL/ AVCO	-	1	1.0	10.0	200 (EST)	24	24	24	1.0	10.0	IN 4-6 ABOVE	-	200 (EST)
11	OFF-SET PRINTER MULTILITH	ADDRESOGRAPH-MULTIGRAPH	1250	1	.75 (EST)	.80 (EST)	640	60	28	48	.75 (EST)	.80 (EST)	3.0	3	640
12	BOOK BINDING STAPLER	BOSTITCH	7	2	.4 (EST)	.40 (EST)	415	60 (EST)	30	60	.8 (EST)	.80 (EST)	.780	2	830
13	NUMBER GENERATOR	-	-	4	.05 (EST)	.17 (EST)	1	10	10	5	.2 (EST)	.68 (EST)	.500 (EST)	2	4
14	OPTICAL COMPARATOR	BRAUN CHEMICAL CO.	4014	1	.5	1.70	30	12	14	24	.5	1.70	2.0	2	30
15	DESITOMETER, LENS TEST CHARTS, AND OTHER OPTICAL TEST ITEMS	BRAUN CHEMICAL CO.	-	1 1	1.0	3.42	100 (EST)	-	-	-	1.0	3.42	2.0 (EST)	6	100 (EST)
16a	CONTINUOUS REDUCING CAMERA	PARAGON REVOLUTE CO.	-	1	1.8	5.15	1,800	62	60	101	1.8	5.15	21.0	4	1,800
16b	PROCESSOR	PARAGON REVOLUTE CO.	_	1	2.2	7.15	1,500	88	40	102 (MAX)	2.2	7.51			1,500
17a	HARD COPY DUPLICATOR (THERMOFAX)	MINN. MINING & MFG. CO.	19	1	3.3	10.93	100 (EST)	16	27	14	3.3	10.93	.499	1	100 (EST)
17b	HARD COPY DUPLICATOR (VERIFAX)	EASTMAN KODAK CO.	SIGNET	1	.15	.52	50 (EST)	12	21	24	.15	.52	.148	1	50 (EST)
18	KINEPLEX	COLLINS RADIO CO.	AN/GSC-4	1	.4	1.2	250	24	28	82	.8	2.4	35.0	12	500
19	KINEPLEX FREQUENCY STANDARD & BUFFER	COLLINS RADIO CO.	DEVELOP	1	.5 (EST)	1.6 (EST)	400 (EST)	24 (EST)	28 (EST)	84 (EST)	1. (EST)	3.2 (EST)	193.0 (EST)	18	800 (EST)
20	STEREOVIEWER	BAUSCH & LOMB	GS-1123	1	.12	.04	150 (EST)	60	36	48	.12	.04	30.470	6	150 (EST)
21	COUNTING & READ OUT	BENSON-LEHNER	GS-1123	1	.46	.15	400 (EST)	25	23	52	.46	.15		6	400 (EST)
	TOTAL										98.44	296.68			29,784

FIG. 4 VOL FIVE
EQUIPMENT LIST, DOCUMENT HANDLING, STORAGE, AND RETRIEVAL SITE "A"

COMPUTER COMPLEX - ON LINE

NO.	EQUIPMENT	VENDOR	MODEL OR CAT.NO.	QUAN.	KVA	10^3 BTU/HR	WT. LBS.	L IN.	W IN.	H IN.	TOTAL KVA	TOTAL 10^3 BTU/HR	TOTAL WT. LBS.	LEASE 3 SHIFT K $	PURCHASE PRICE K $	LEAD TIME IN MONTHS
1	CENTRAL PROCESSOR UNIT	IBM	7100	1	5.0	13.7	3,800	56	60	69	5.0	13.7	3,800	30.555	707.50	21
2	CONSOLE CONTROL UNIT	IBM	7151	1	1.2	3.4	1,000	61	41	44	1.2	3.4	1,000	2.205	61.70	21
3	POWER CONVERTER	IBM	7608A 7608B	1 1	1.9 -	5.1 -	2,000 1,200	61 56	29 30	58 69	1.9 -	5.1 -	3,200	2.880	60.00	21
4	CORE STORAGE	IBM	7302	1	2.5	6.8	1,900	56	30	69	2.5	6.8	1,900	35.640	950.00	21
5	MULTIPLEXOR	IBM	7606	1	2.5	6.8	1,900	56	30	69	2.5	6.8	1,900	7.020	156.30	21
6	DATA CHANNEL ADAPTER	IBM	(L) * 7607-I	2	2.5	6.8	1,900	56	30	69	5.0	13.6	3,800	8.100	208.40	21
7	DATA CHANNEL ADAPTER	IBM	(L) * 7607-II	2	2.5	6.8	1,900	56	30	69	5.0	13.6	3,800	6.300	169.90	21
8	DATA CHANNEL ADAPTER	IBM	(L) * 7607-	4	2.5	6.8	1,900	56	30	69	10.0	27.2	7,600	8.100	208.4	21
9	FILE CONTROL UNIT	IBM	(L) -	4	1.5	5.1	2,000	56	30	69	6.0	20.4	8,000	9.000	210.0	21
10.	RANDOM ACCESS STORAGE UNIT	IBM	(L) -	12	9.48	32.4	2,500	68	33	68 5/8	113.76	388.8	30,000	4.50	125.0	21
11.	MAGNETIC TAPE UNIT	IBM	(L) 729-IV	8	1 8	3.9	1,200	34	29	69	14.4	31.2	9,600	1.620	48.50	21
12.	DIRECT DATA CONNECTION	IBM	-	2	2.4	4.0	NEG.	INCLUDED IN 7606,7607 & 7100			4.8	8.0	NEG.	2.16	60.00	21
13.	PUNCHED PAPER TAPE READER	FERRANTI	TR7	1	.1	.3 (EST.)	200 (EST.)	29	24	48	.1 (EST.)	.3 (EST.)	200 (EST.)	-	9.5	5
14.	PAPER TAPE READER	FERRANTI	TR5	1	.1 (EST.)	.3 (EST.)	34	9	11 1/2	10	.1 (EST.)	.3 (EST.)	34	-	2.39	3
15.	INPUT - OUTPUT CONTROL DEVICE	IBM	(L) (A)	2	1.0 (EST.)	3.0 (EST.)	300 (EST.)	30 5/8	29	53	2.0		600 (EST.)			21
16.	PRINTER	IBM	(L) (B)	1	4.0 (EST.)	9.2 (EST.)	2,000 (EST.)	29	47 3/4	53 1/4	4.0 (EST.)	25.0 (EST.)	2,000 (EST.)	6.30	175.00	21
17.	CARD PUNCH & READER	IBM	(L) (C)	1	4.0 (EST.)	9.2 (EST.)	1,000 (EST.)	29 3/4	57 1/2	45 1/2	4.0 (EST.)		1,000 (EST.)			21
18.	PAPER TAPE ADAPTER	IBM	(L) (E)	2	.3 (EST.)	.8 (EST.)	150 (EST.)	-	-	-	.6 (EST.)	1.6 (EST.)	300 (EST.)	1.0	50.0	21
19.	SPOOLER (FOR TR5 PAPER TAPE READER)	FERRANTI	ALL	2	.1 (EST.)	.3 (EST.)	21	13	8	12	.2	.6	42		.36	3
	TOTALS										183.1	566.4	78,776	127.18	3,252.95	

* INCLUDES ONE TEST UNIT/ADAPTER
(L) LEASED

COMPUTER COMPLEX - OFF LINE

1.	PAPER DETACHER	MOORE	313	1	.2	.7	425	50	32	40	.2	.7	425	-	1.3	6
2.	ACCOUNTING MACHINE	IBM	(L) 407	1	1.8	5.5	3,286	73	31	51	1.8	5.5	3,286	1.440	42.00	6
3.	REPRODUCING PUNCH	IBM	(L) 519	1	1.6	4.1	1,311	53	25	49 1/2	1.6	4.1	1,311	.243	6.55	6
4.	INTERPRETER	IBM	(L) 557	1	.5	1.2	834	43	29 1/2	46	.5	1.2	834	.297	9.40	5
5.	SORTER	IBM	(L) 083	1	.6	.9	500	62 1/2	20	47	.6	.9	500	.198	6.20	4
6.	COLLATER	IBM	(L) 087	1	1.4	4.6	1,027	42 3/4	28 3/8	51 1/8	1.4	4.6	1,027	.387	12.70	10
7.	CARD PUNCH	IBM	(L) 026	3	.4	.9	208	31	28	39	1.2	2.7	624	.108	3.20	4
8.	PAPER TAPE PUNCH	REM-RAND	SYNCRO TAPE	6	.6	2.0	75 (EST.)	60	30	30	3.6	12.0	450 (EST.)	.6	1.96	4
9.	VERIFIER	IBM	(L) 056	1	.4	.9	222	31	28	39	.4	.9	222	.100	2.4	4
10.	STAPLER	BOSTITCH	3D	1	.3	NEG.	250 (EST.)	26 (EST.)	33 (EST.)	60 (EST.)	.3	NEG.	250 (EST.)	-	.590 + TAX	3
11.	SPECIAL DEVICES	IBM	(L) -	-	-	-	-	-	-	-	-	-	-	.200	4.20	3
	TOTALS										11.6	32.6	8,929	3.573	90.50	

(L) LEASED

FIG. 5 VOL FIVE
EQUIPMENT LIST, COMPUTER
COMPLEX, SITE "B"

ROOM "S" FOURTH FLOOR

NO.	EQUIPMENT	VENDOR	MODEL OR CAT. NO.	QUAN.	KVA	10^3 BTU/HR	WT. LBS.	D IN.	W IN.	H IN.	TOTAL KVA	TOTAL 10^3 BTU/HR	TOTAL WT.LBS	LEASE 3 SHIFT K $	PURCHASE PRICE K $	LEAD TIME IN MONTHS
1	DISPLAY COMPUTER	G.E.	312-C	1	5 (EST)	15.3 (EST)	6,800 (EST)	26	187 (EST)	76	5.0 (EST)	15.3 (EST)	6,800 (EST)		275.0 (EST)	18
2	ICONORAMA	FENSKE FEDRICK & MILLER	SPECIAL	1	6 (EST)	20.4 (EST)	1,000 (EST)	26 (EST)	256 (EST)	56 (EST)	6.0 (EST)	20.4 (EST)	1,000 (EST)		241.0	9
3	ICONORAMA CONTROL CONSOLE	FENSKE FEDRICK&& MILLER	SPECIAL	1	.2 (EST)	.6 (EST)	350 (EST)	36 (EST)	42 (EST)	42 (EST)	.2 (EST)	.6 (EST)	350 (EST)		3.0 (EST)	12
4	LIGHT VALVE PROJECTOR	G.E.	DEVELOP	1	3.0 (EST)	10.2 (EST)	1,000 (EST)	36 (EST)	48 (EST)	66 (EST)	3.0 (EST)	10.2 (EST)	1,000 (EST)		136.0	18
5	L.V.P. POWER SUPPLY	G.E.	DEVELOP	1	2.0 (EST)	6.8 (EST)	500 (EST)	36 (EST)	36 (EST)	60 (EST)	2.0 (EST)	6.8 (EST)	500 (EST)		-	18
6	L.V.P. CONTROL CONSOLE	G.E.	DEVELOP	1	.2 (EST)	.6 (EST)	350 (EST)	36 (EST)	42 (EST)	42 (EST)	.2 (EST)	.6 (EST)	350 (EST)		5.0 (EST)	12
7	FLYING SPOT SCANNER	G.E.	DEVELOP	1	1.5 (EST)	5.1 (EST)	1,200 (EST)	48 (EST)	36 (EST)	75 (EST)	1.5 (EST)	5.1 (EST)	1,200 (EST)		48.3	18
8	REAR PROJECTION SCREEN (6 FT. x 8 FT.)	POLACOAT	LF60G	1	0	0	216	.375	96	72	0	0	216		.864	.5
9	REAR PROJECTION SCREEN	POLACOAT	LF60G	1	0	0	162	.375	72	72	0	0	162		.648	.5
10	X-Y ITEM CAPTURE UNIT	FENSKE FEDRICK & MILLER	SPECIAL	1	1.2 (EST)	4. (EST)	200 (EST)	8 (EST)	10 (EST)	16 (EST)	1.2 (EST)	4. (EST)	200 (EST)		8.0 (EST)	6
11	T.V. CAMERA, CONSOLE, & MONITOR	G.E.	SPECIAL	1	1.0 (EST)	3.4 (EST)	650 (EST)	36 (EST)	48 (EST)	54 (EST)	1.0 (EST)	3.4 (EST)	650 (EST)		-	12
12	T.V. RECEIVER (21 INCH)	G.E.	TE-5A	1	.2	.6	500	48	24	48	.2	.6	500		-	6
13	TEXDISPLAY	L.F.E.	SM-2 SPECIAL	1	.05 (EST)	.17 (EST)	150 (EST)	32 (EST)	3((EST)	36 (EST)	.05 (EST)	.17 (EST)	150 (EST)		-	12
14	PHOTOGRAPHIC CAMERA	BEATTLE-COLEMAN	E	1	.05 (EST)	0.14 (EST)	15 (EST)	12 (EST)	5 (EST)	10 (EST)	.05 (EST)	0.14 (EST)	15 (EST)		.965	.5
15	TELEPHONE ANSWERING SERVICE	ELECTRONIC	DCR-TA	2	.2 (EST)	.5 (EST)	55 (EST)	13 (EST)	17 (EST)	9 (EST)	.4 (EST)	1.0 (EST)	110 (EST)		1.324	.75
16	INTERCOM	EXECUTONE	1211E	1	.1 (EST)	.34 (EST)	25 (EST)	12 (EST)	12 (EST)	9 (EST)	.1 (EST)	.68 (EST)	25 (EST)		.39	.5
17	SEARCH AND RETRIEVAL FILM MECHANISM	BELL & HOWELL	DEVELOP	1	1.1 (EST)	3.4 (EST)	350 (EST)	36 (EST)	48 (EST)	36 (EST)	1.1 (EST)	3.4 (EST)	350 (EST)		50.0	15
18	HEMISPHERICAL DISPLAY UNIT	BATELLE INSTITUTE	DEVELOP	1	1. (EST)	3.2 (EST)	1,500 (EST)	72 (EST)	132 (EST)	111 (EST)	1.0 (EST)	3.2 (EST)	1,500 (EST)		85.0 (EST)	12
	TOTAL										23.0	75.59	15,078			

FIG. 6 VOL FIVE
EQUIPMENT LIST, ROOM "S",
SITE "B"

ROOM "A" FOURTH FLOOR

NO.	EQUIPMENT	VENDOR	MODEL OR CAT. NO.	QUAN.	KVA	10^3 BTU/HR.	WT. LBS.	D IN.	W IN.	H IN.	TOTAL KVA	TOTAL 10^3 BTU/HR	TOTAL WT.LBS.	LEASE 3 SHIFT K $	PURCHASE PRICE K $	LEAD TIME IN MONTHS
1	DISPLAY COMPUTER	G.E.	312-C	1	5.0 (EST)	15.3 (EST)	6,800 (EST)	26	187 (EST)	76	5.0 (EST)	15.3 (EST)	6,800 (EST)		275.0 (EST)	18
2	LIGHT VALVE PROJECTOR	G.E.	DEVELOP	1	3.0 (EST)	10.2 (EST)	1,000 (EST)	36 (EST)	48 (EST)	66 (EST)	3. (EST)	10.2 (EST)	1,000 (EST)		136.0	18
3	L.V.P. POWER SUPPLY	G.E.	DEVELOP	1	2. (EST)	6.8 (EST)	500 (EST)	36 (EST)	36 (EST)	60 (EST)	2.0 (EST)	6.8 (EST)	500 (EST)			18
4	L.V.P. CONTROL CONSOLE	G.E.	DEVELOP	1	.2 (EST)	.6 (EST)	350 (EST)	36 (EST)	42 (EST)	42 (EST)	.2 (EST)	.6 (EST)	350 (EST)		5.0 (EST)	12
5	FLYING SPOT SCANNER	G.E.	DEVELOP	1	1.5 (EST)	5.1 (EST)	1,200 (EST)	48 (EST)	36 (EST)	75 (EST)	1.5 (EST)	5.1 (EST)	1,200 (EST)		48.3	18
6	REAR PROJECTION SCREEN (6 FT. HIGH X 8 FT. WIDE)	POLACOAT	LF60G	1	0	0	216	.375	96	72	0	0	216		.864	.5
7	REAR PROJECTION SCREEN	POLACOAT	LF60G	1	0	0	60	.25	48	60	0	0	60		.240	.5
8	X-Y ITEM CAPTURE UNIT	FERSKE FEDRICK & MILLER	SPECIAL	1	1.2 (EST)	4. (EST)	200 (EST)	8 (EST)	10 (EST)	16 (EST)	1.2 (EST)	4.0 (EST)	200 (EST)		8.0 (EST)	6
9	T.V. CAMERA, CONSOLE & MONITOR	G.E.	SPECIAL	1	1.3 (EST)	5.1 (EST)	750 (EST)	36 (EST)	72 (EST)	54 (EST)	1.3 (EST)	5.1 (EST)	500 (EST)		.900 (EST)	12
10	T.V. RECEIVER (21 INCH)	G.E.	TE-5A	2	.2	.6	500	48	24	48	.4	1.2	1,000			6
11	TEXDISPLAY	L.F.E.	SM-2 SPECIAL	2	.05 (EST)	0.17 (EST)	150 (EST)	32 (EST)	30 (EST)	36 (EST)	1.0 (EST)	.34 (EST)	150 (EST)			12
12	SEARCH & RETRIEVAL FILM MECHANISM	BELL & HOWELL	DEVELOP	1	1.1 (EST)	3.4 (EST)	350 (EST)	36 (EST)	48 (EST)	36 (EST)	1.1 (EST)	3.4 (EST)	350 (EST)		50.0	15
13	KINEPLEX	COLLINS RADIO	AN/GSC-4	1	.4	1.2	250	24	28	82	.4	1.2	250		35.0	12
14	KINEPLEX FREQUENCY STANDARD & BUFFER	COLLINS RADIO	DEVELOP	1	.5 (EST)	1.6 (EST)	400 (EST)	24 (EST)	28 (EST)	84 (EST)	.5 (EST)	1.6 (EST)	800 (EST)		193.0 (EST)	18
15	OVERHEAD PROJECTOR	AMERICAN OPTICAL	3520	1	1.1	3.4	36	12	21	13	1.1	3.4	36		.313	.5
16	LECTURN INCLUDING MICROPHONES	TELE-PROMPTER	PRESI-DENTIAL	1	.3 (EST)	1.0 (EST)	145 (EST)	35	26	49	.3 (EST)	1.0 (EST)	145 (EST)		.600 (EST)	.5
17	TELEPHONE ANSWERING SERVICE UNIT	ELECTRONIC SECRETARY	DCR-TA	2	.2 (EST)	.5 (EST)	55 (EST)	13	17	9	.4 (EST)	1.0 (EST)	110 (EST)		1.324	.75
18	PUBLIC ADDRESS SYSTEM	BOGEN	L-60	1	.2 (EST)	.6 (EST)	37	13	16	5	.2 (EST)	.6 (EST)	37 (EST)		.30	.5
19	PHOTOGRAPHIC CAMERA	BEATTIE COLEMAN	E	1	.05 (EST)	0.14 (EST)	15 (EST)	12 (EST)	5 (EST)	10 (EST)	.05 (EST)	0.14 (EST)	15 (EST)		.965	.5
20	INTERCOM SYSTEM	EXECUTONE	1211E MODIFIED	2	.1 (EST)	0.34 (EST)	25 (EST)	12	12	9	0.2 (EST)	1.36 (EST)	50 (EST)		.78 (EST)	.5
21	SLIDE PROJECTOR (WITH CHANGER)	TELE-PROMPTER	6000	1	3.0 (EST)	10.2 (EST)	55 (EST)	19	24	28	3.0 (EST)	10.2 (EST)	55 (EST)		.4 (EST)	.5
22	MOVIE PROJECTOR (16MM)	TECHNICAL SERVICES INC.	ST-15	1	1.3	4.1	62	16	10	14	1.3	4.1	62		.575	.5
23	FILM STRIP PROJECTOR	VICTOR	PS-65	1	.5 (EST)	1.4 (EST)	28 (EST)	16	8	14	.5 (EST)	1.4 (EST)	28 (EST)		.118	.5
	TOTAL										24.65	78.04	13,914			

FIG. 7 VOL FIVE
E EQUIPMENT LIST, ROOM "A"
SITE "B"

ROOM "W" BASEMENT

NO.	EQUIPMENT	VENDOR	MODEL OR CAT. NO.	QUAN.	KVA	10^3 BTU/HR	WT. LBS.	D IN.	W IN.	H IN.	TOTAL KVA	TOTAL 10^3 BTU/HR	TOTAL WT LBS.	LEASE 3 SHIFT K $	PURCHASE PRICE K $	LEAD TIME IN MONTHS
1	LIGHT VALVE PROJECTOR	G. E.	DEVELOP	2	3.0 (EST)	10.2 (EST)	1,000 (EST)	36 (EST)	48 (EST)	66 (EST)	6.0 (EST)	20.4 (EST)	2,000 (EST)		272.0	18
2	L.V.P. POWER SUPPLY	G.E.	DEVELOP	2	2.0 (EST)	6.8 (EST)	500 (EST)	36 (EST)	36 (EST)	60 (EST)	4.0 (EST)	13.6 (EST)	1,000 (EST)			
3	FLYING SPOT SCANNER	G.E.	DEVELOP	2	1.5 (EST)	5.1 (EST)	1,200 (EST)	48 (EST)	36 (EST)	75 (EST)	3.0 (EST)	10.2 (EST)	2,400 (EST)		48.3	18
4	L.V.P. CONTROL CONSOLE	G.E.	DEVELOP	2	.2 (EST)	.6 (EST)	350 (EST)	36 (EST)	42 (EST)	42 (EST)	.4 (EST)	1.2 (EST)	700 (EST)		10.	12
5	REAR PROJECTION SCREEN	POLACOAT	LF60G	2	0	0	216	.375	96	72	0	0	432		1.728	.5
6	REAR PROJECTION SCREEN	POLACOAT	LF60G	2	0	0	38	.25	39	48	0	0	76		.308	.5
7	X-Y ITEM CAPTURE UNIT	FEWSKE FEDRICK & MILLER	SPECIAL	2	1.2 (EST)	4.0 (EST)	200 (EST)	8 (EST)	10 (EST)	16 (EST)	2.4 (EST)	8.0 (EST)	400 (EST)		8.	6
8	T.V. CAMERA, CONSOLE AND MONITOR	G.E.	SPECIAL	1	1.0 (EST)	3.4 (EST)	650 (EST)	36 (EST)	48 (EST)	54 (EST)	1.0 (EST)	3.4 (EST)	650 (EST)		-	12
9	T.V. RECEIVER 21-INCH	G.E.	TE-5A	1	.2	.6	500	48	24	48	.2	.6	500		-	6
10	TEXDISPLAY	L.F.E.	SM-2 SPECIAL	2	.05 (EST)	.17 (EST)	150 (EST)	32 (EST)	30 (EST)	36 (EST)	.1 (EST)	.34 (EST)	300 (EST)		-	12
11	SYMBOL GENERATOR AND MULTIPLEXOR	L.F.E.	DEVELOP	1	.6 (EST)	1.7 (EST)	300 (EST)	24 (EST)	24 (EST)	60 (EST)	.6 (EST)	1.7 (EST)	300 (EST)		65.0	12
12	TELEPHONE ANSWERING UNIT	ELECTRONIC SECRETARY	DCR-TA	2	.2 (EST)	.5 (EST)	55 (EST)	13	17	9	.4 (EST)	1. (EST)	110 (EST)		1.324	.75
13	SEARCH & RETRIEVAL FILM MECHANISM	BELL & HOWELL	DEVELOP	2	1.1 (EST)	3.4 (EST)	350 (EST)	36 (EST)	48 (EST)	36 (EST)	2.2 (EST)	6.8 (EST)	700 (EST)		50.0	15
14	OVERHEAD PROJECTOR	AMERICAN OPTICAL	3520	2	1.1	3.4	36	12	21	13	2.2	6.8	72		.313	.5
15	PHOTOGRAPHIC CAMERA	BEATTLE COLEMAN	E	2	.05 (EST)	0.14 (EST)	15 (EST)	12 (EST)	5 (EST)	10 (EST)	.10 (EST)	.28 (EST)	30 (EST)		.965	.5
16	INTERCOM AND AMPLIFIER	EXECU-TONE	1211E J-13 PS-12-A	1	.2 (EST)	.6 (EST)	75 (EST)	12 (EST)	12 (EST)	24 (EST)	0.2 (EST)	.6 (EST)	75 (EST)		.8	.5
	TOTALS										22.80	74.92	9,745			

FIG. 8 VOL FIVE
EQ EQUIPMENT LIST, ROOM "W"
SITE "B"

AREA "O" BASEMENT

NO.	EQUIPMENT	VENDOR	MODEL OR CAT. NO.	QUAN.	KVA	10^3 BTU/HR	WT. LBS.	D IN
1	TEXDISPLAY	L.F.E.	SM-2 SPECIAL	3	.05 (EST)	.17 (EST)	150 (EST)	32 (ES
2	DISPLAY COMPUTER	G.E.	312-C	2	5 (EST)	15.3 (EST)	6,800 (EST)	2(
3	KINEPLEX	COLLINS RADIO CO.	AN/GSC-4	2	.4	1.2	250	24
4	KINEPLEX FREQUENCY STANDARD & BUFFER	COLLINS RADIO CO.	DEVELOP	2	.5 (EST)	1.6 (EST)	400 (EST)	2((E
	TOTALS							

"O" BASEMENT

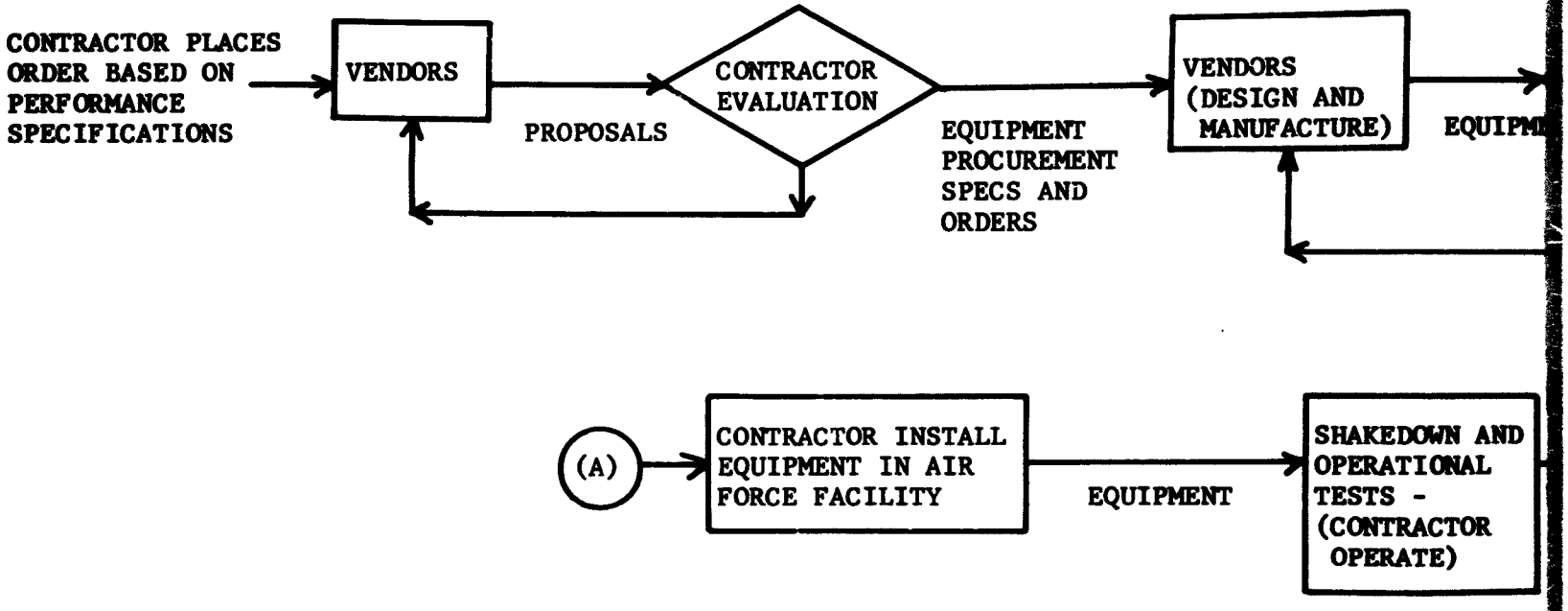
QUAN.	KVA	10^3 BTU/HR	WT. LBS.	D IN.	W IN.	H IN.	TOTAL KVA	TOTAL 10^3 BTU/HR	TOTAL WT IN LBS.	LEASE 3 SHIFT K	LEASE 3 SHIFT $	PURCHSE PRICE K $	LEAD TIME IN MONTHS
3	.05 (EST)	.17 (EST)	150 (EST)	32 (EST)	30 (EST)	36 (EST)	.15 (EST)	.51 (EST)	450 (EST)			-	12
2	5 (EST)	15.3 (EST)	6,800 (EST)	26	139 (EST)	76	10 (EST)	30.6 (EST)	13,600			275.0 (EST)	18
2	.4	1.2	250	24	28	82	.8	2.4	500			35.0	12
2	.5 (EST)	1.6 (EST)	400 (EST)	24 (EST)	28 (EST)	84 (EST)	1. (EST)	3.2 (EST)	800 (EST)			193.0 (EST)	18
							11.95	36.71	15,350				

FIG. 9 VOL FIVE
EQUIPMENT LIST, AREA O, SITE B

NO.	EQUIPMENT	VENDOR	MODEL OR CAT. NO.	QUAN.	KVA	10^3 BTU/HR	WT. LBS.
1	TV RECEIVER (21 INCH)	G.E.	TE-5A	8	.2	.6	500
2	INTERCOM	EXECUTONE	1211E	8	.1 (EST)	.34 (EST)	25 (EST)
	TOTALS						

WT. LBS.	D IN.	W IN.	H IN.	TOTAL KVA	TOTAL 10^3 BTU/HR	TOTAL WT LBS.	LEASE 3 SHIFT K $	PURCHASE PRICE K $	LEAD TIME IN MONTHS
500	48	24	48	1.6	4.8	4,000		—	6
25 (EST)	12	12	9	0.8 (EST)	2.72 (EST)	200 (EST)		.39 (EST)	.5
				2.4	7.52	4,200			

FIG. 10 VOL FIVE
EQUIPMENT LIST
STAFF OFFICES, SITE B


CONTRACTOR PLACES ORDER BASED ON PERFORMANCE SPECIFICATIONS
VENDORS
PROPOSALS
CONTRACTOR EVALUATION
EQUIPMENT PROCUREMENT SPECS AND ORDERS
VENDORS (DESIGN AND MANUFACTURE)
EQUIPM
(A)
CONTRACTOR INSTALL EQUIPMENT IN AIR FORCE FACILITY
EQUIPMENT
SHAKEDOWN AND OPERATIONAL TESTS - (CONTRACTOR OPERATE)

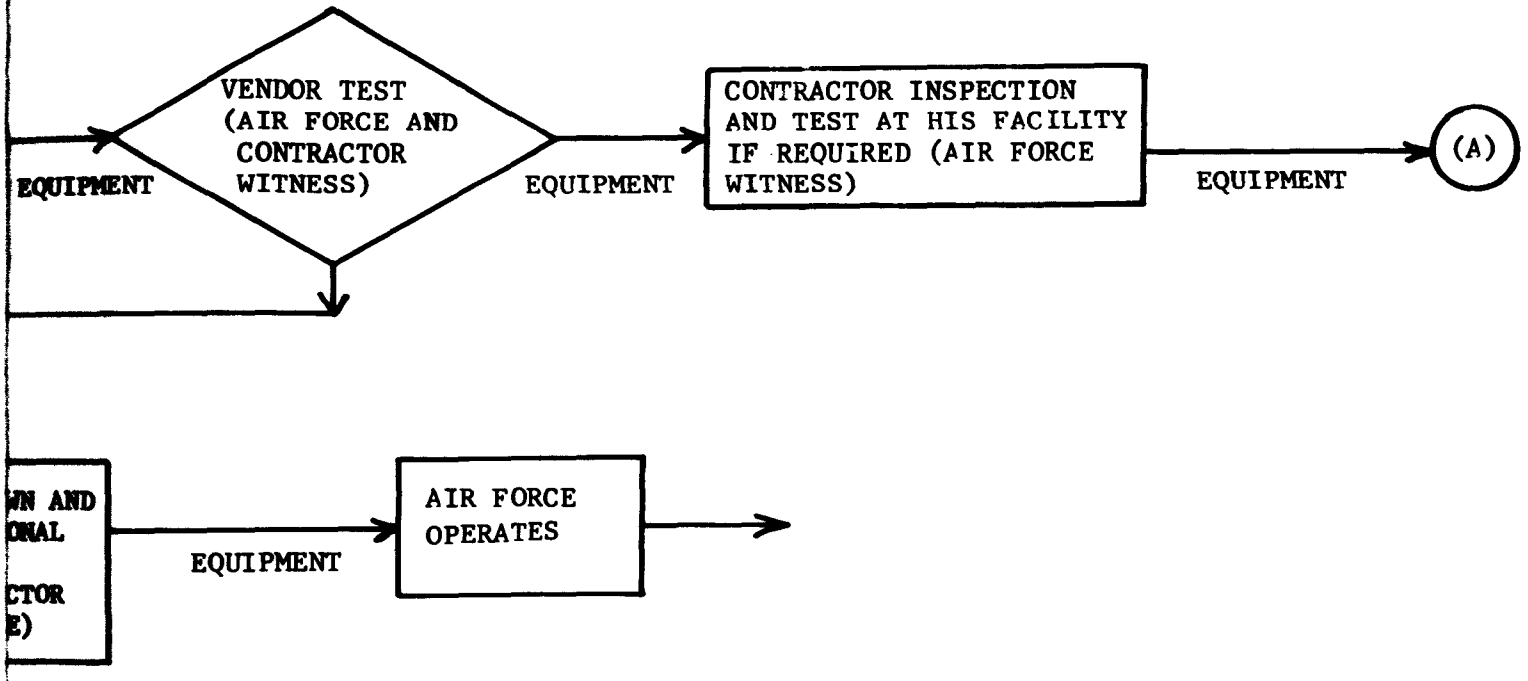
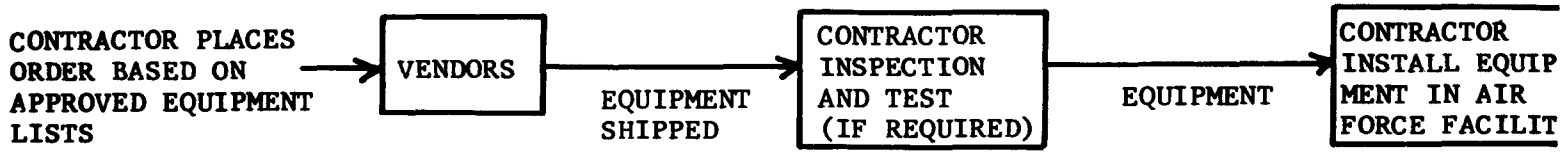


FIG. 11 VOL FIVE
FLOW DIAGRAM
EQUIPMENT NOT COMMERCIALLY AVAILABLE


CONTRACTOR PLACES ORDER BASED ON APPROVED EQUIPMENT LISTS
VENDORS
EQUIPMENT SHIPPED
CONTRACTOR INSPECTION AND TEST (IF REQUIRED)
EQUIPMENT
CONTRACTOR INSTALL EQUIP MENT IN AIR FORCE FACILIT

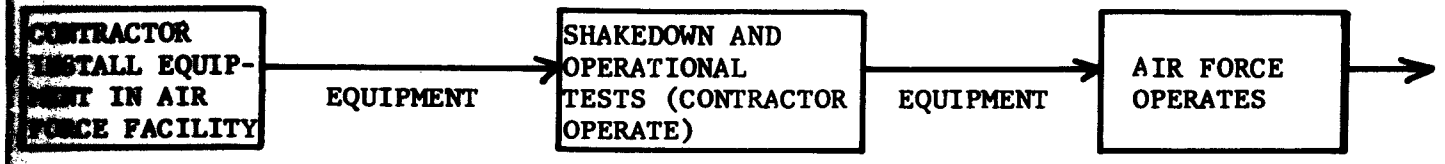
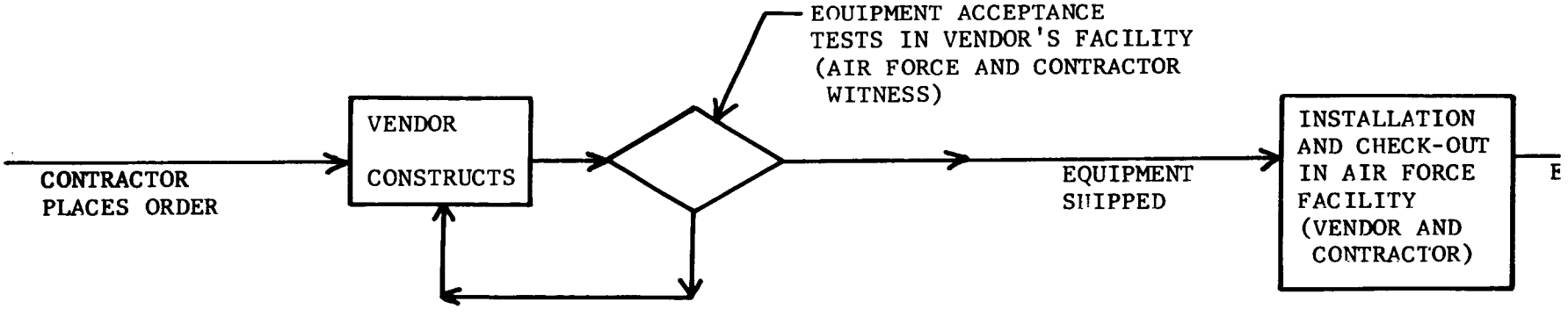


FIG. 12 VOL FIVE
FLOW DIAGRAM
EQUIPMENT COMMERCIALLY AVAILABLE


EQUIPMENT ACCEPTANCE
TESTS IN VENDOR'S FACILITY
(AIR FORCE AND CONTRACTOR
WITNESS)
VENDOR
CONSTRUCTS
CONTRACTOR
PLACES ORDER
EQUIPMENT
SHIPPED
INSTALLATION
AND CHECK-OUT
IN AIR FORCE
FACILITY
(VENDOR AND
CONTRACTOR)

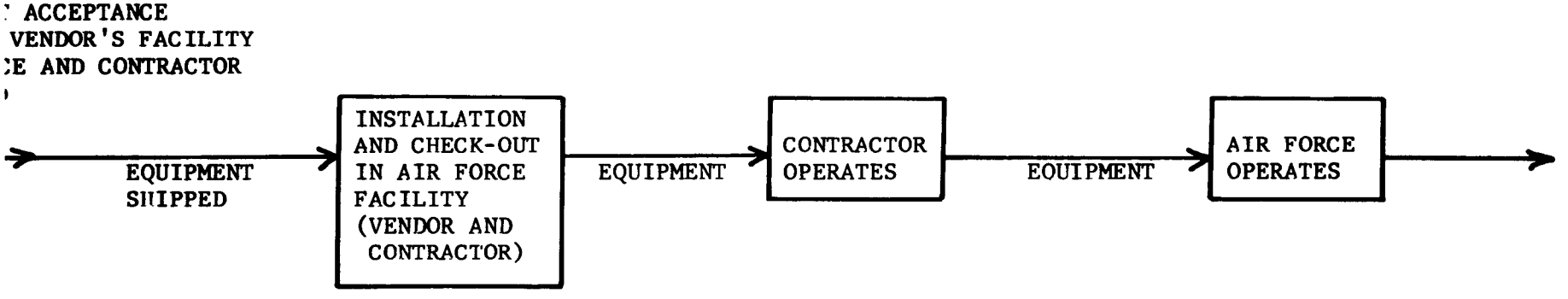
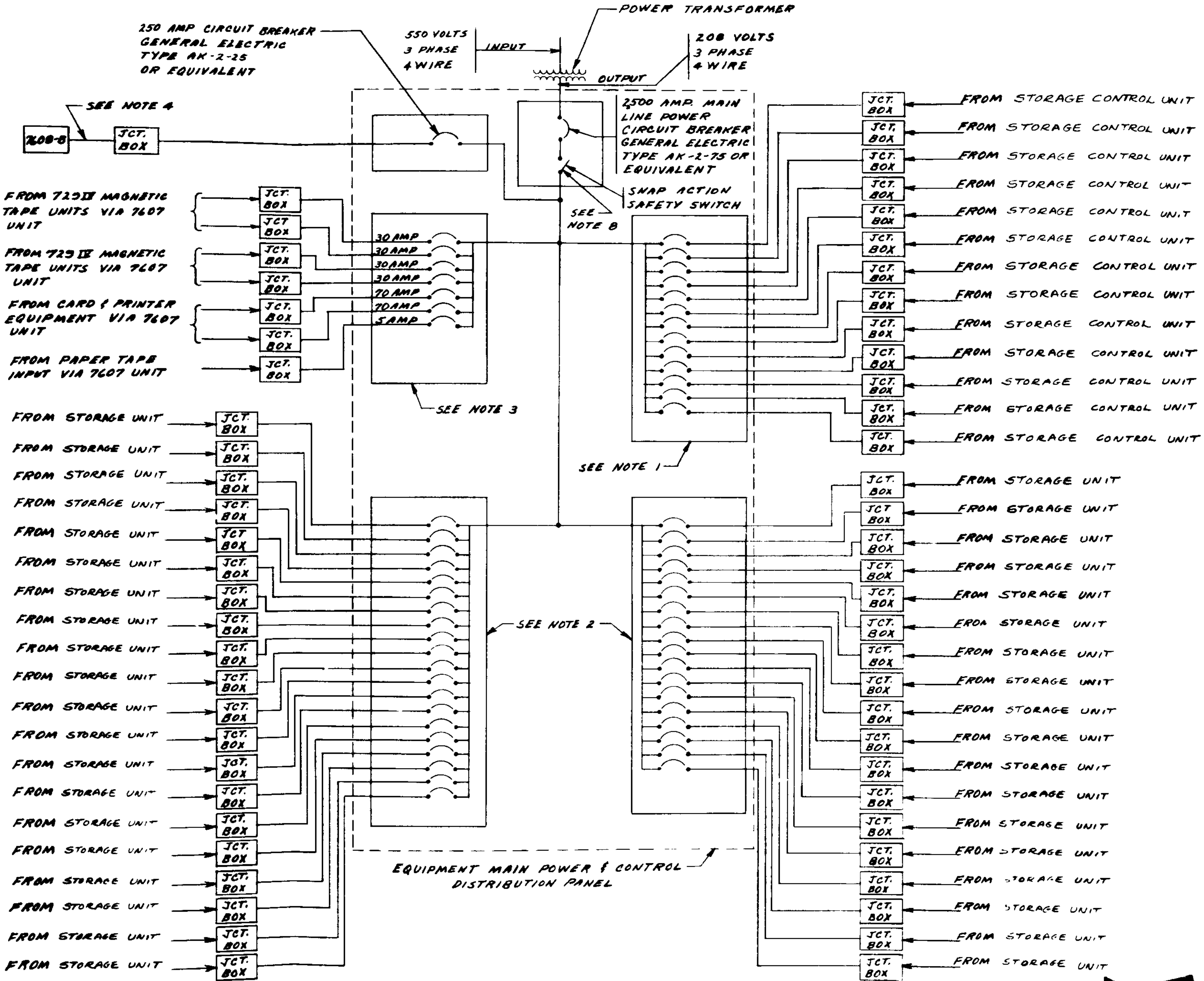


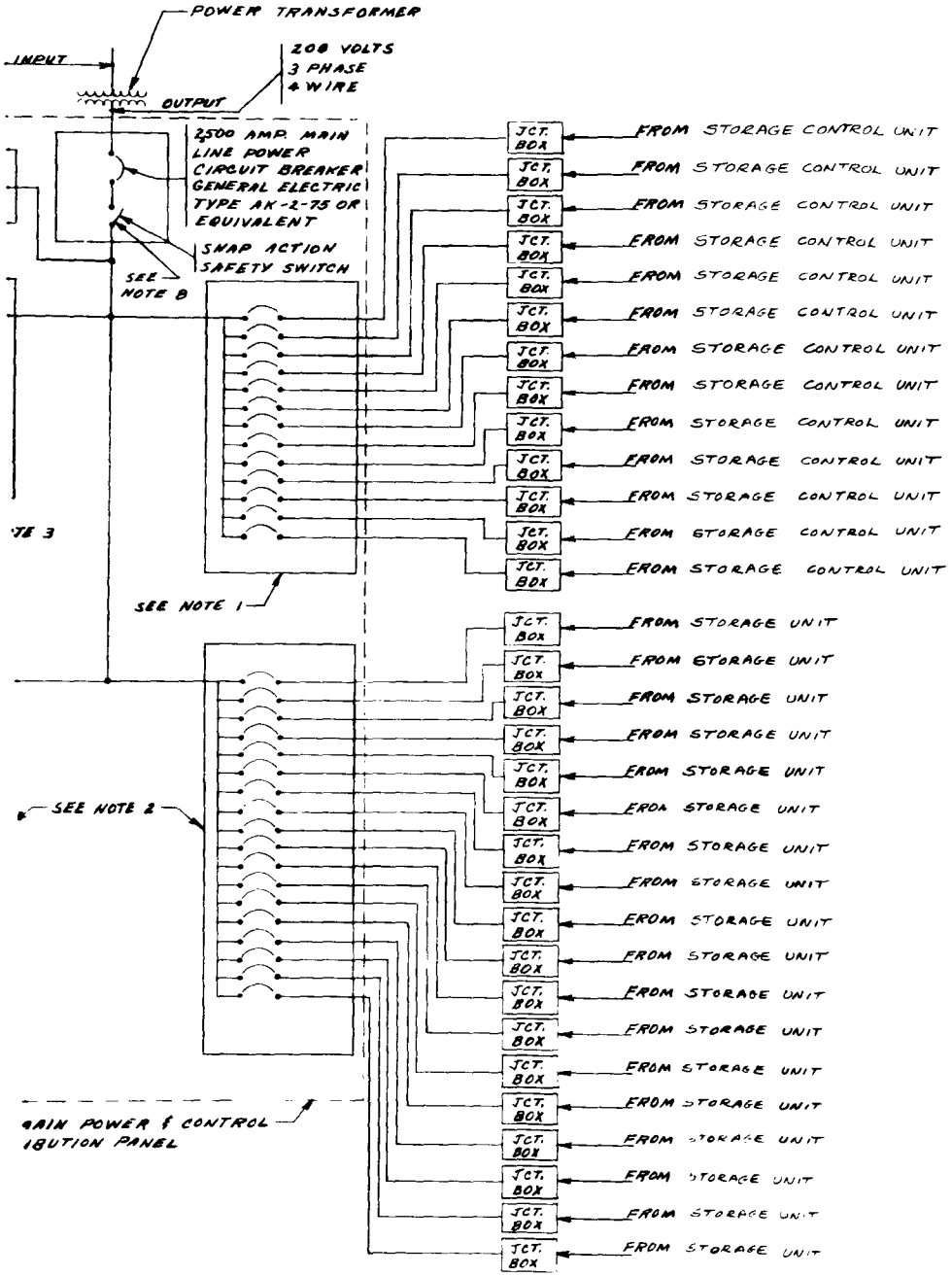
FIG. 13 VOL FIVE
FLOW DIAGRAM
LEASED EQUIPMENT

	FLOOR		MINIMUM CEILING	EQUIPMENT HEAT DISSIPATION	EQUIPMENT INPUT
	AREA SQ.FT.	LOADING LB/SQ.FT.	HEIGHT FT.	BTU/HR	KVA
SITE A					
PROCESSING AND STORAGE DIVISION					
MAIL AND DISTRIBUTION BRANCH	2,274	100	8		
PROCESSING BRANCH	5,073	100	10	176,500	71.5
RECORDS BRANCH					
HARD COPY LIBRARY	2,148	100	9	11,500	3.5
MAP, CHART AND PHOTO LIBRARY	2,944	100	9	16,000	4.0
FILM AND MAGNETIC TAPE LIBRARY	1,525	100	9	-	-
EDIT - CODING DIVISION					
TAPE CONVERSION BRANCH	-		8	108,700	31.8
DATA PROCESSING DIVISION					
MACHINE OPERATION BRANCH	-				
ON-LINE DATA PROCESSING EQUIPMENT	5,350	125	8	57,300	21.2
OFF-LINE DATA PROCESSING EQUIPMENT	2,194	125	8	32,600	11.6
ADMINISTRATIVE DIVISION					
COMMUNICATIONS BRANCH	3,212	125	9	150,000	50.0
SITE B					
DATA PROCESSING DIVISION					
MACHINE OPERATION BRANCH					
ON-LINE DATA PROCESSING EQUIPMENT	2,584	125	8	566,400	183.1
OFF-LINE DATA PROCESSING EQUIPMENT	450	125	8	32,600	11.6
ROOM "A"	1,800	100	9	78,040	24.65
ROOM "S"	3,420	100	9	75,590	23.0
ROOM "W"	1,575	100	8	74,920	22.8
AREA "O"	-	100	8	36,710	11.95

FIG. 14 VOL FIVE
SITE A AND SITE B AREA SPECIFICATIONS, EQUIPMENT, ELECTRICAL INPUT AND HEAT DISSIPATION



NOT
1.
2.
3.
4.
5.
6
7.
8
9.



NOTE:

1. FOR EACH STORAGE CONTROL UNIT
   (1) 30 AMP CIRCUIT BREAKER
   30 AMP TRIP.
   (2) CABLE FROM FILE CONTROL UNIT TO JUNCTION BOX FURNISHED BY IBM

2. FOR EACH STORGE UNIT
   (1) 70 AMP CIRCUIT BREAKER
   70 AMP TRIP.
   (2) CABLE FROM STORAGE UNIT TO JUNCTION BOX FURNISHED BY IBM

3. CABLE FROM 7607 UNIT TO JUNCTION BOX FURNISHED BY IBM.

4. CABLE FROM 7608 TO JUNCTION BOX FURNISHED BY IBM. CABLE LENGTH IS TO BE HELD TO A MINIMUM.

5. ALL JUNCTION BOXES TO BE MOUNTED UNDERNEATH THE SUB-FLOORING.

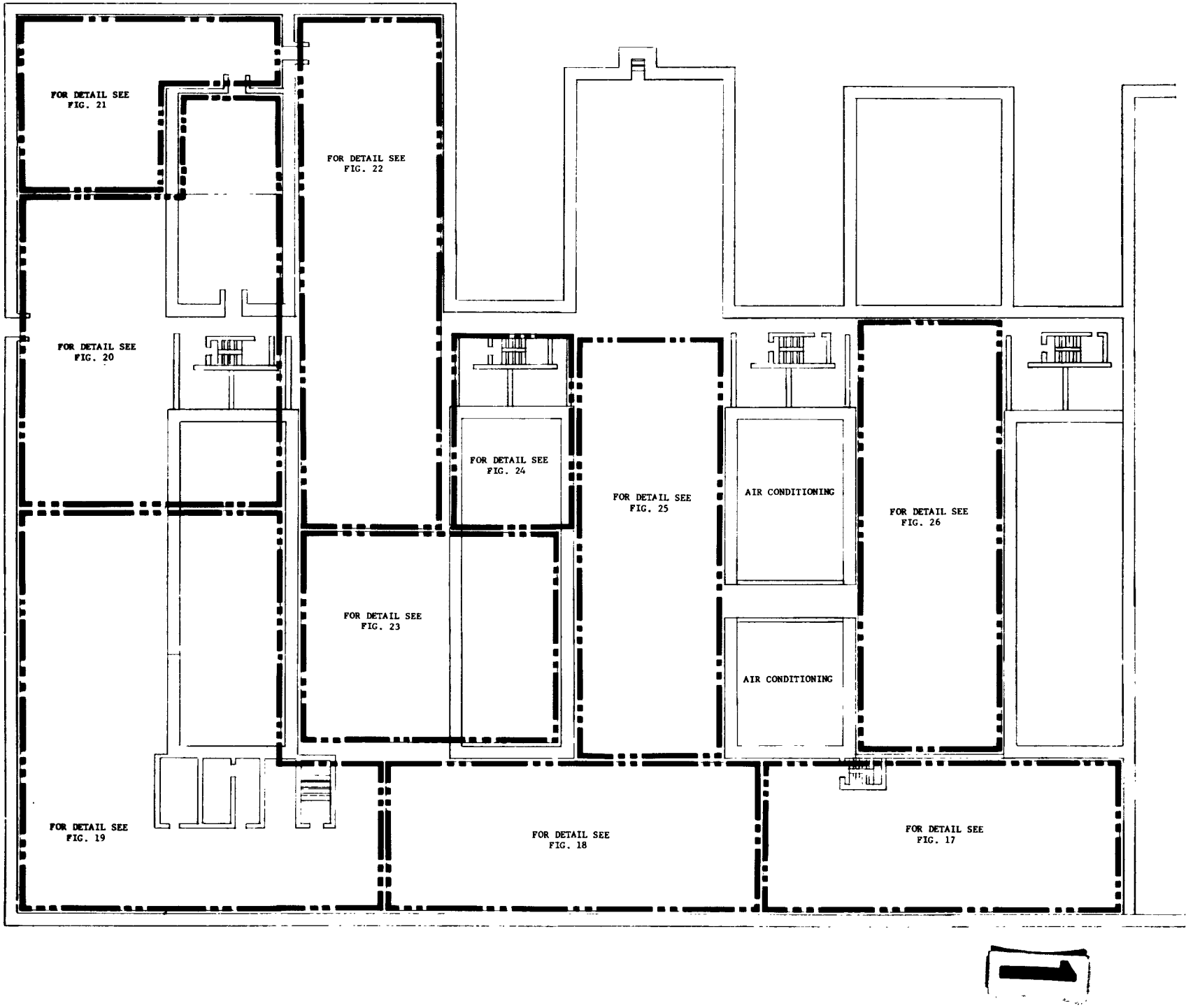
6. AN EQUIPMENT GROUND WIRE, CONNECTING ALL EQUIPMENTS & CONTROL PANELS TO AN EARTHEN GROUND IS REQUIRED

7. CONNECT THE NEUTRAL OF THE THREE PHASE SYSTEM AND THE EQUIPMENT GROUND TOGETHER, EITHER AT THE MAIN POWER DISTRIBUTION PANEL OR THE POWER TRANSFORMER.

8. PANIC BUTTON SHALL BE REMOTELY CONTROLLED FROM THREE SEPARATE SWITCHES LOCATED IN THE EQUIPMENT AREA.

9. ALL OTHER CABLES, ALL CIRCUIT BREAKERS & CONTROL PANELS, JUNCTION BOXES TO BE FURNISHED BY ELECTRICAL CONTRACTOR.

FIG. 15 VOL FIVE
POWER DISTRIBUTION DIAGRAM, COMPUTER EQUIPMENT, SITE "A"


FOR DETAIL SEE FIG. 21
FOR DETAIL SEE FIG. 22
FOR DETAIL SEE FIG. 20
FOR DETAIL SEE FIG. 24
FOR DETAIL SEE FIG. 25
AIR CONDITIONING
FOR DETAIL SEE FIG. 26
FOR DETAIL SEE FIG. 23
AIR CONDITIONING
FOR DETAIL SEE FIG. 19
FOR DETAIL SEE FIG. 18
FOR DETAIL SEE FIG. 17

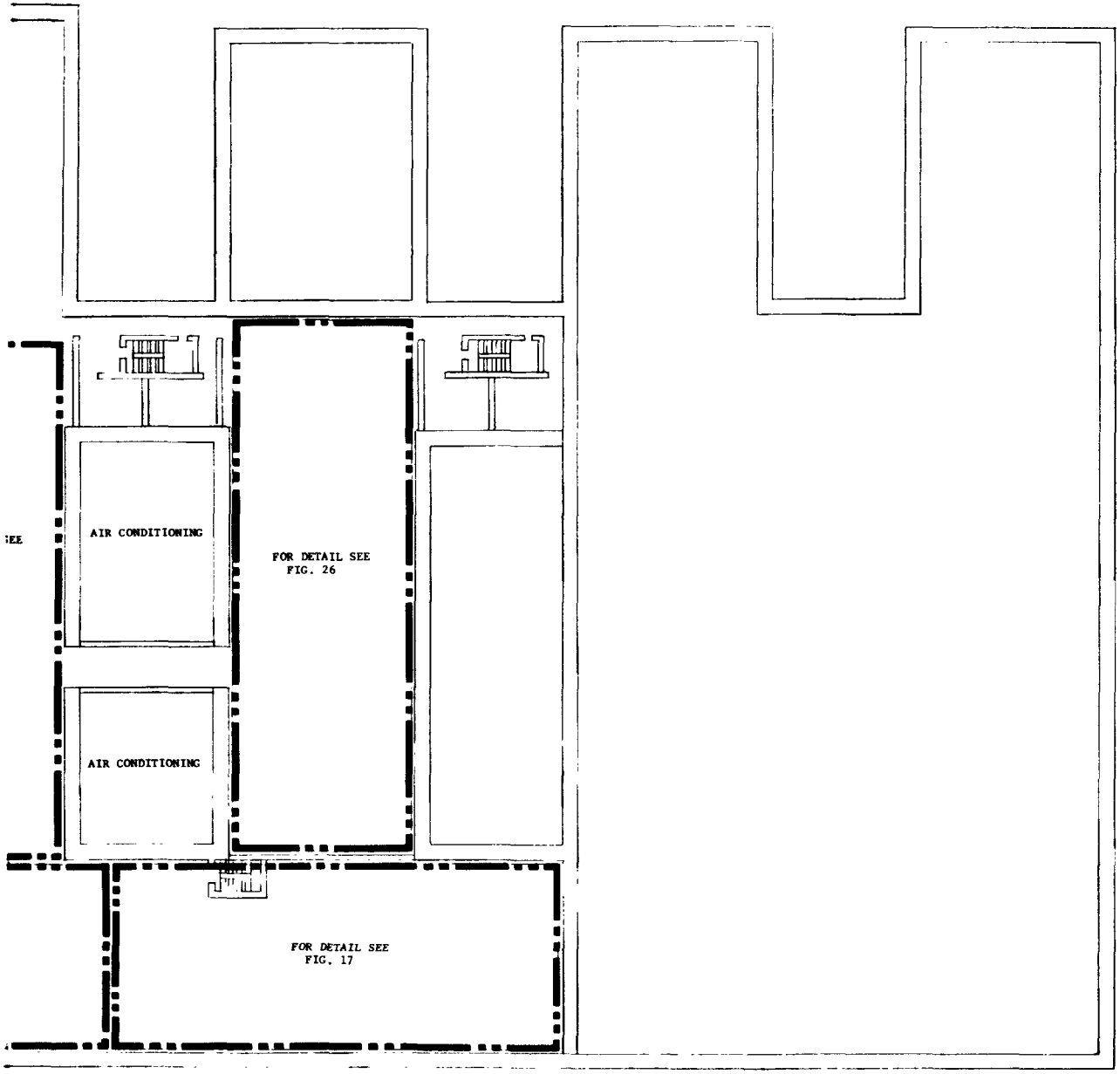
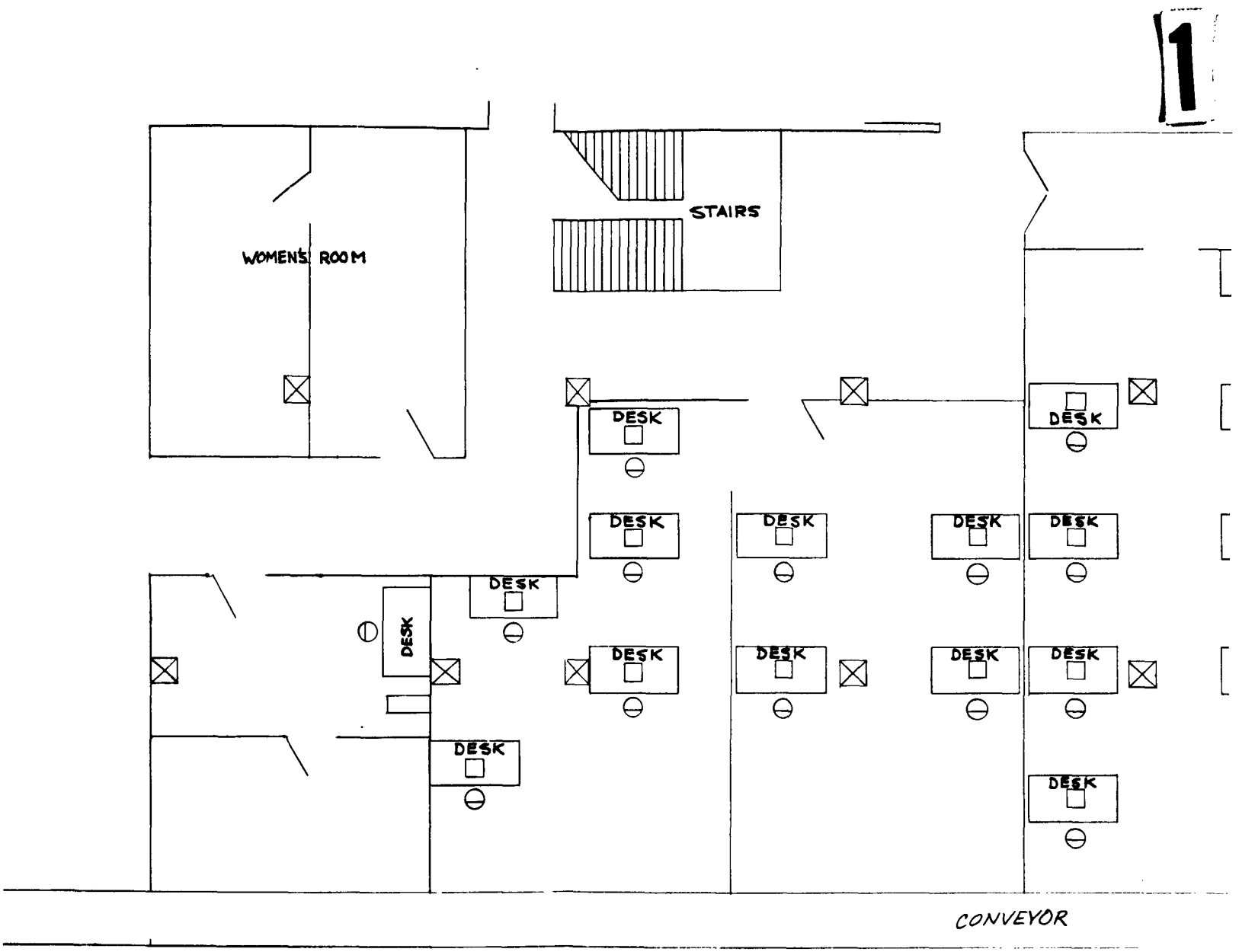


FIG. 16 VOL FIVE
PICTORIAL INDEX OF EQUIPMENT
LOCATION FOR SITE "A" BASEMENT


1
WOMENS ROOM
STAIRS
DESK
DESK
DESK
DESK
DESK
DESK
DESK
DESK
DESK
DESK
DESK
DESK
DESK
CONVEYOR

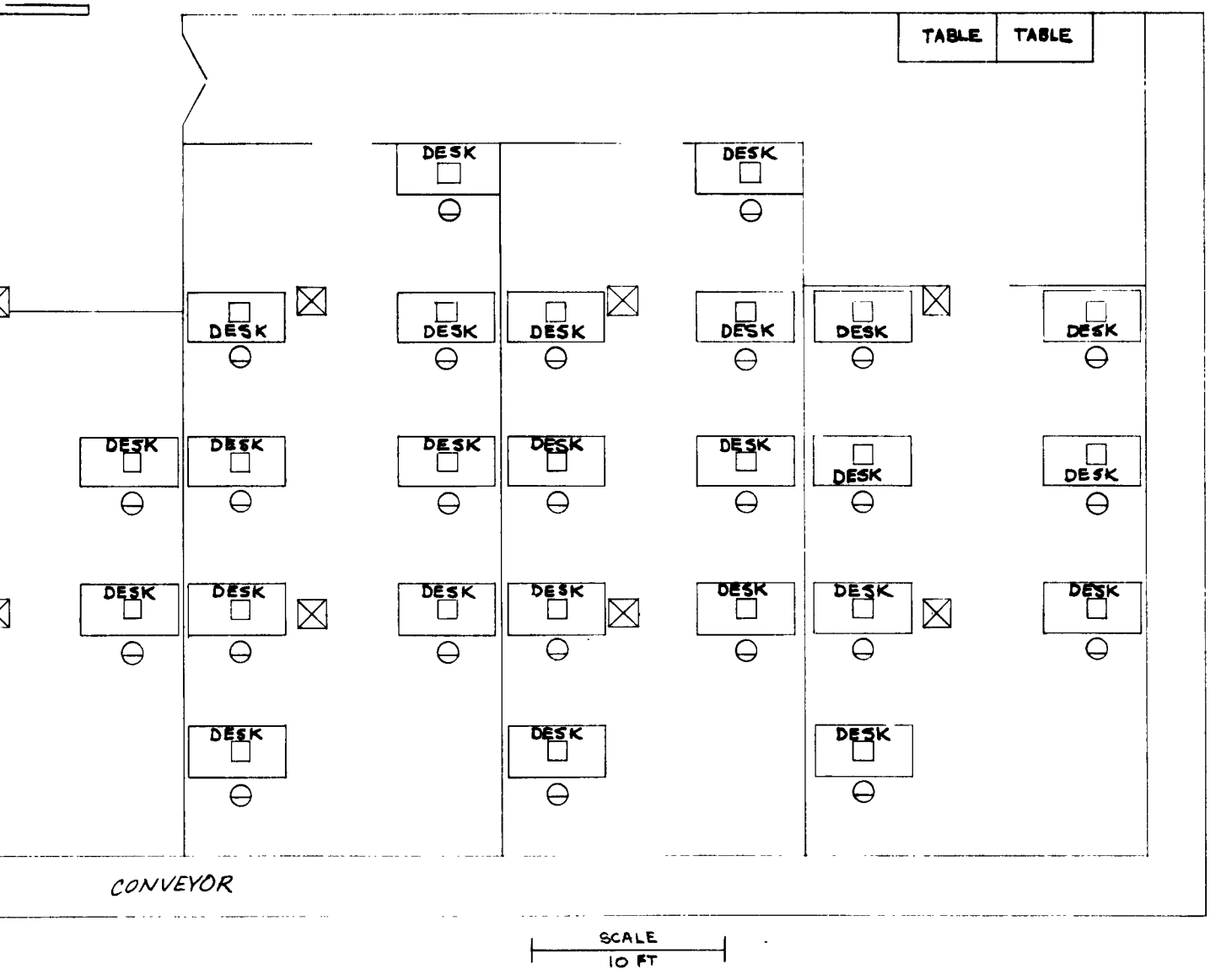
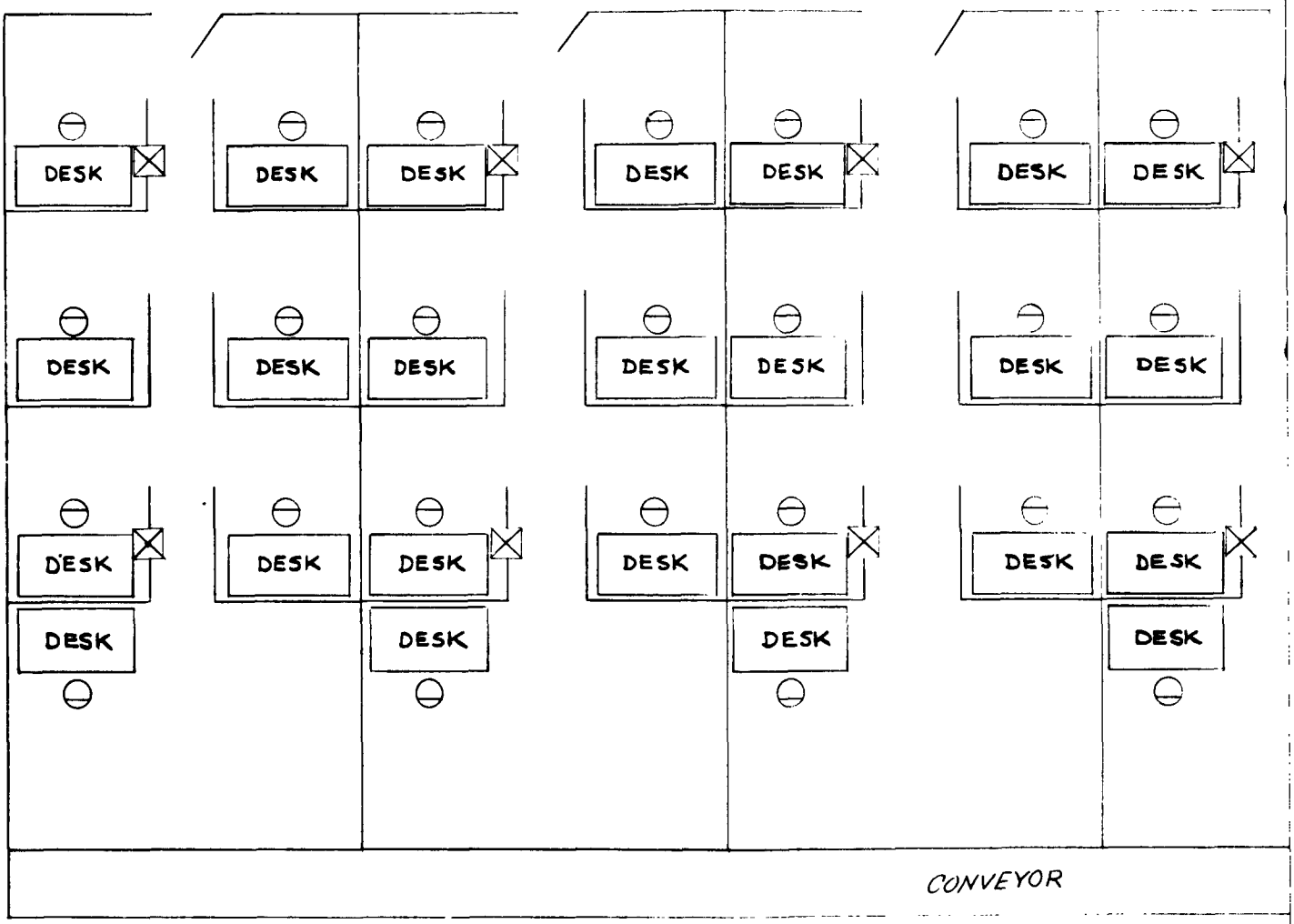


FIG. 17 VOL FIVE
EQUIPMENT LOCATIONS,
TAPE CONVERSION AREA,
SITE "A"


DESK
CONVEYOR

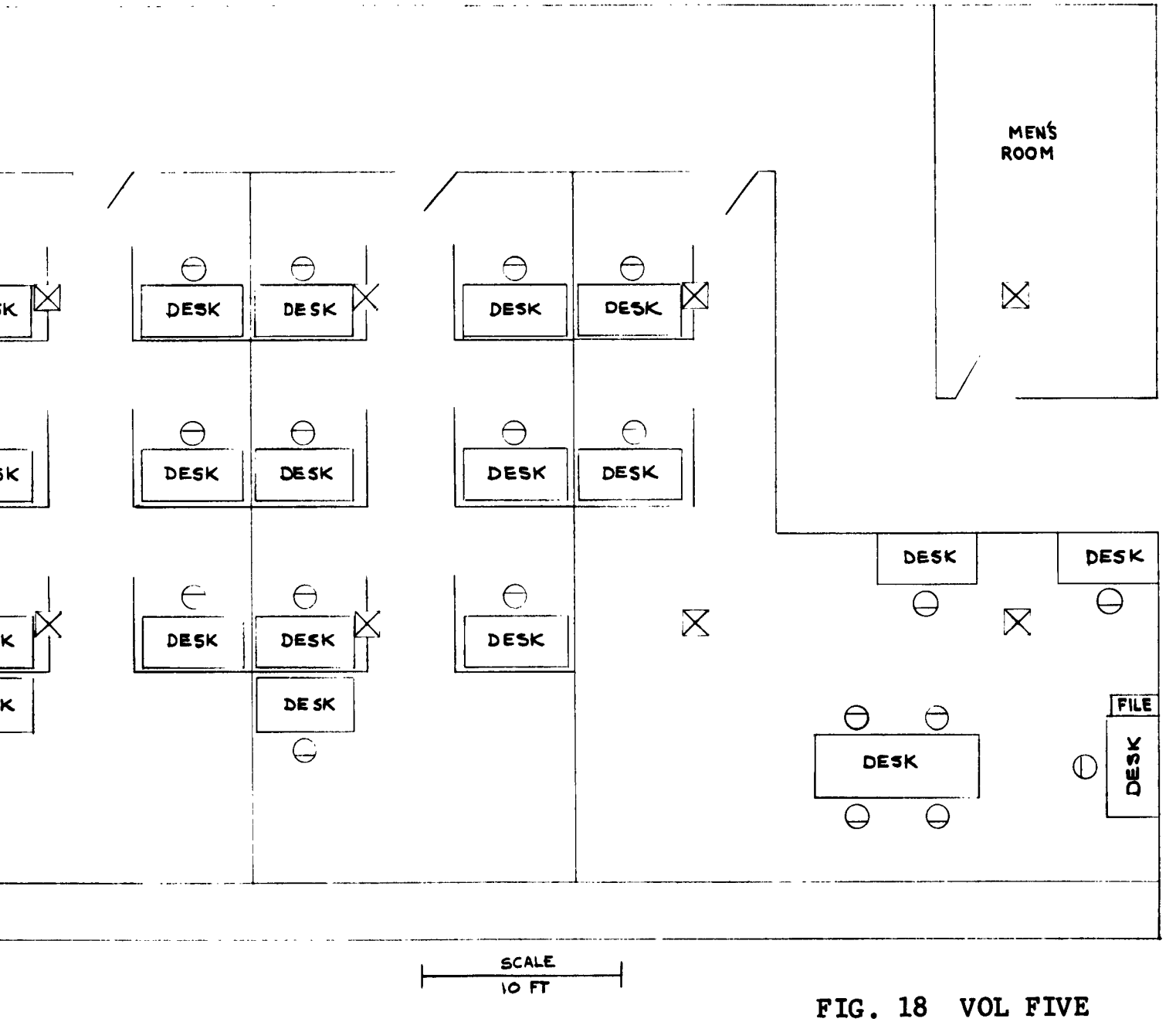


FIG. 18 VOL FIVE
EQUIPMENT LOCATIONS,
EDIT - CODING AREA I, SITE "A"

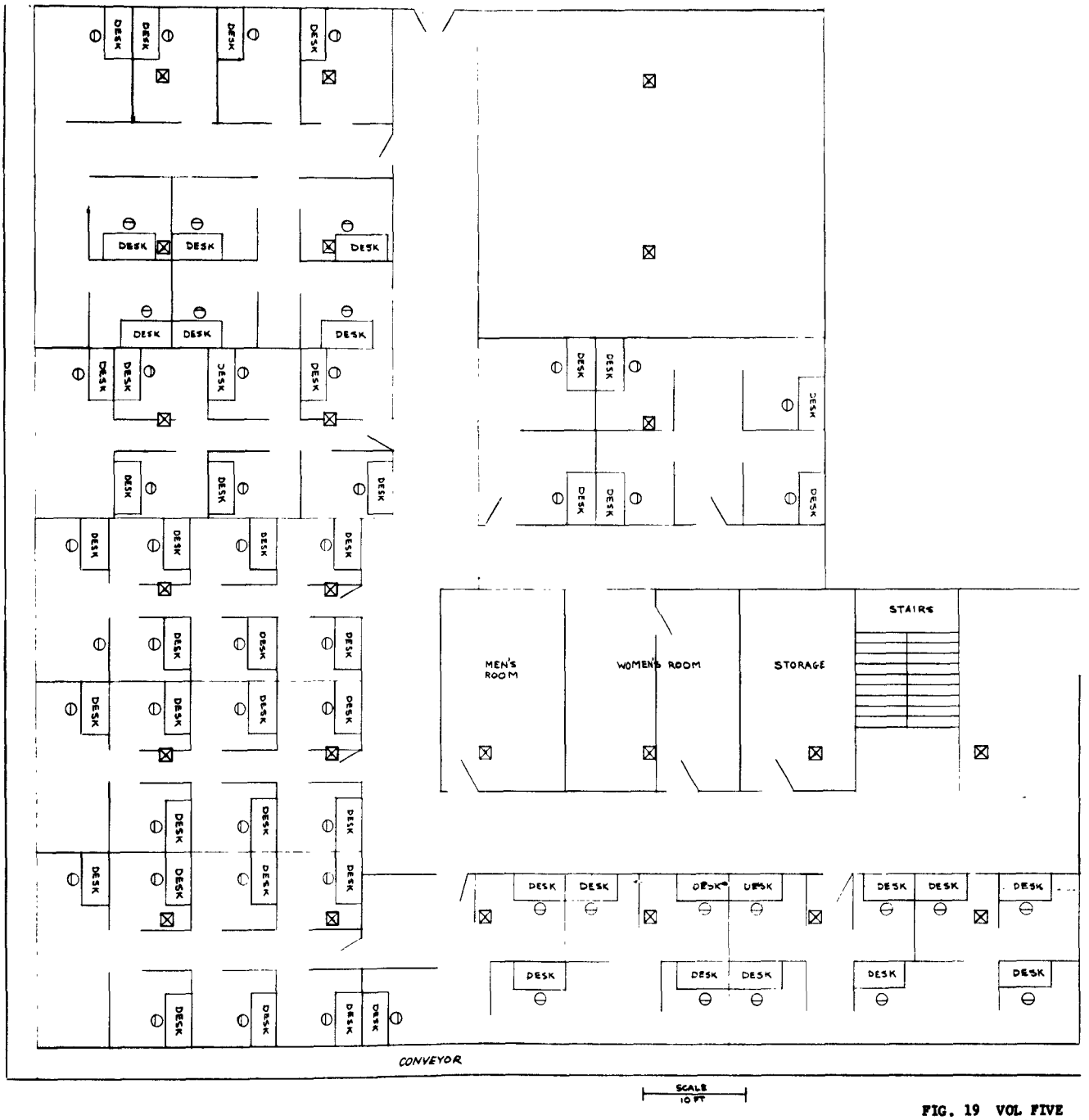
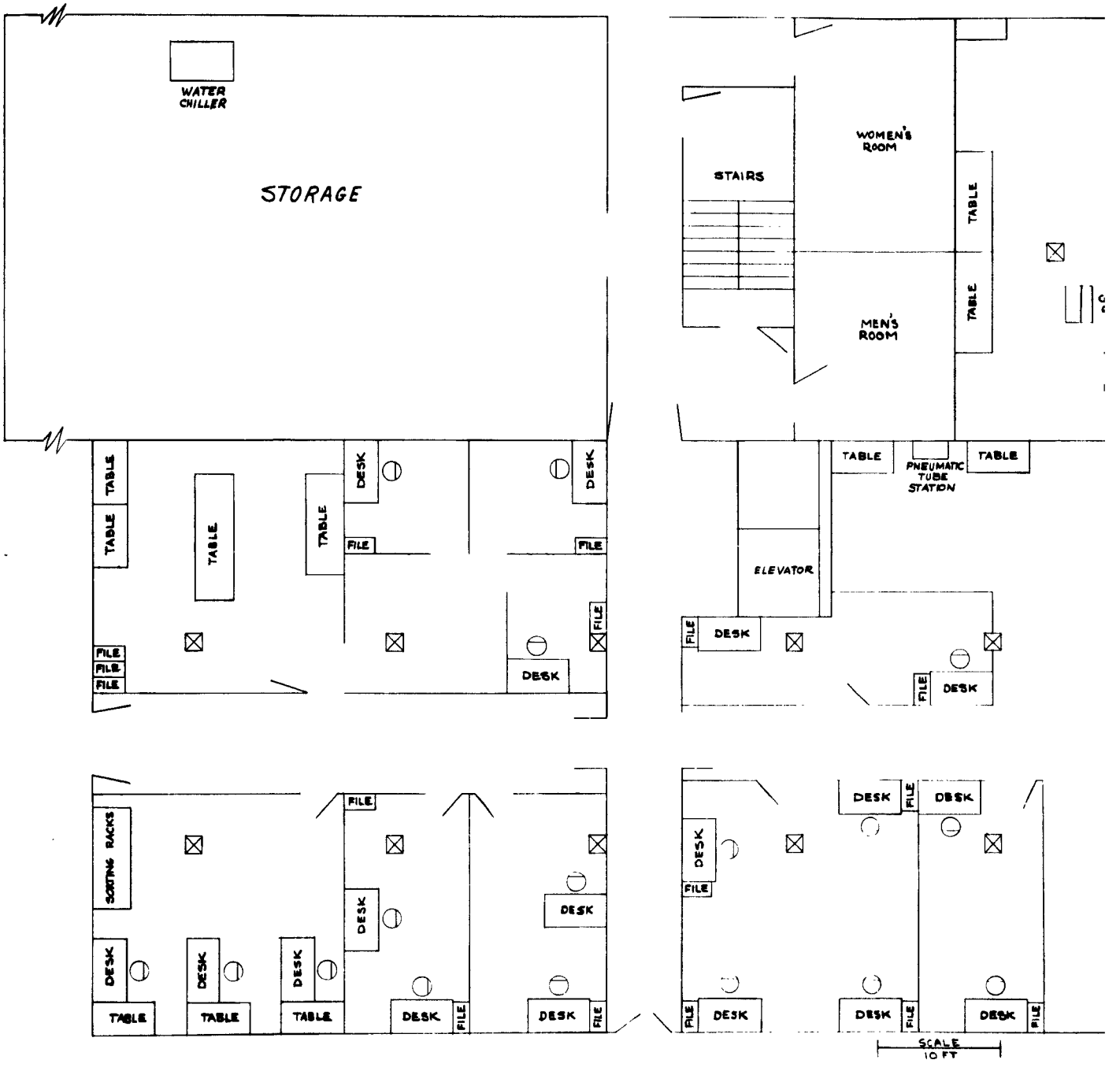


FIG. 19 VOL FIVE
EQUIPMENT LOCATIONS,
EDIT-CODING AREA II, SITE "A"


WATER CHILLER
STORAGE
WOMEN'S ROOM
STAIRS
MEN'S ROOM
TABLE
TABLE
TABLE
TABLE
TABLE
TABLE
TABLE
TABLE
DESK
DESK
DESK
FILE
FILE
FILE
FILE
FILE
FILE
FILE
FILE
FILE
PNEUMATIC TUBE STATION
ELEVATOR
DESK
DESK
DESK
DESK
DESK
DESK
DESK
DESK
DESK
DESK
SORTING RACKS
SCALE
10 FT

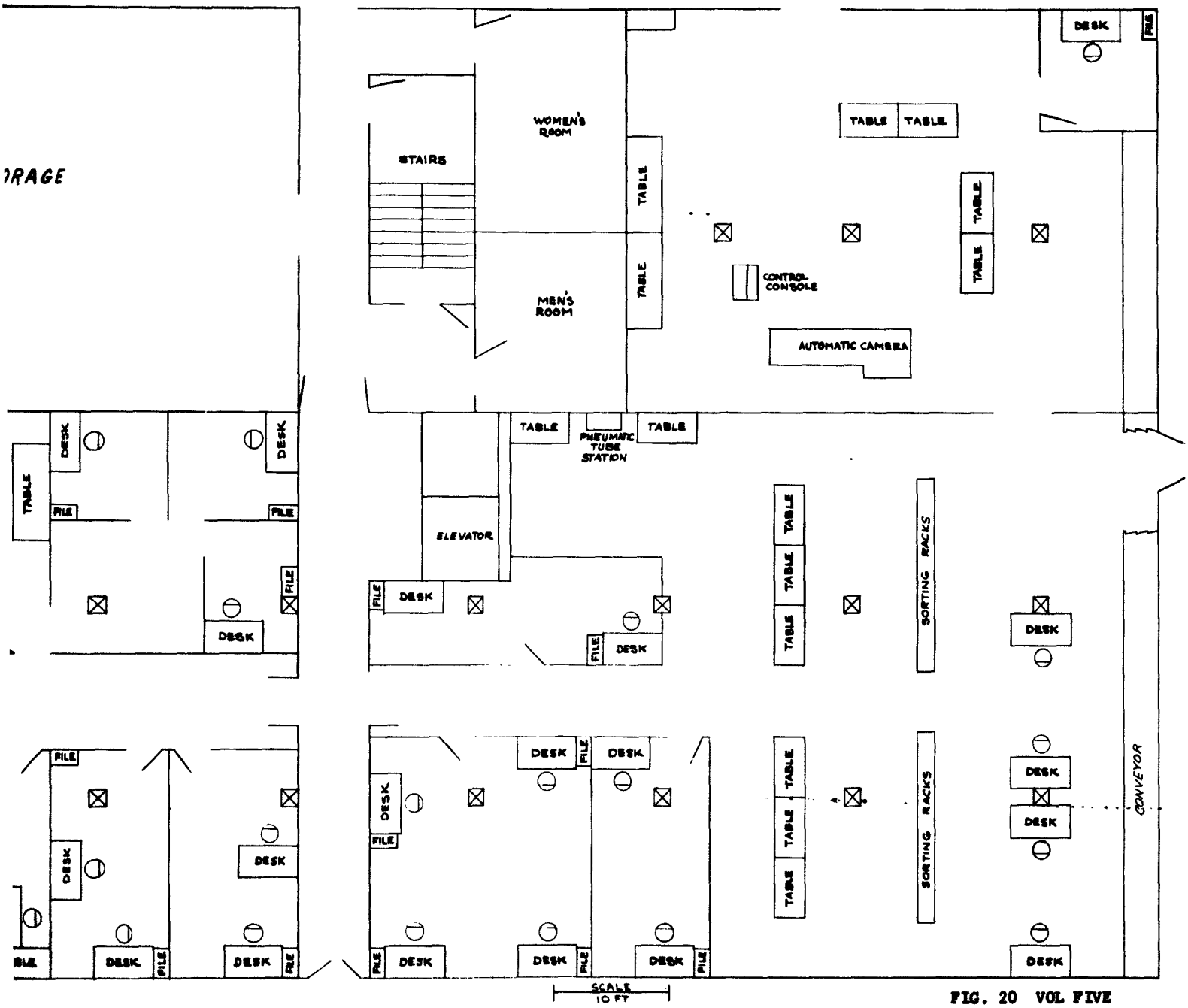


FIG. 20 VOL FIVE
EQUIPMENT LOCATIONS,
DOCUMENT RECEIVING AREA, SITE "A"

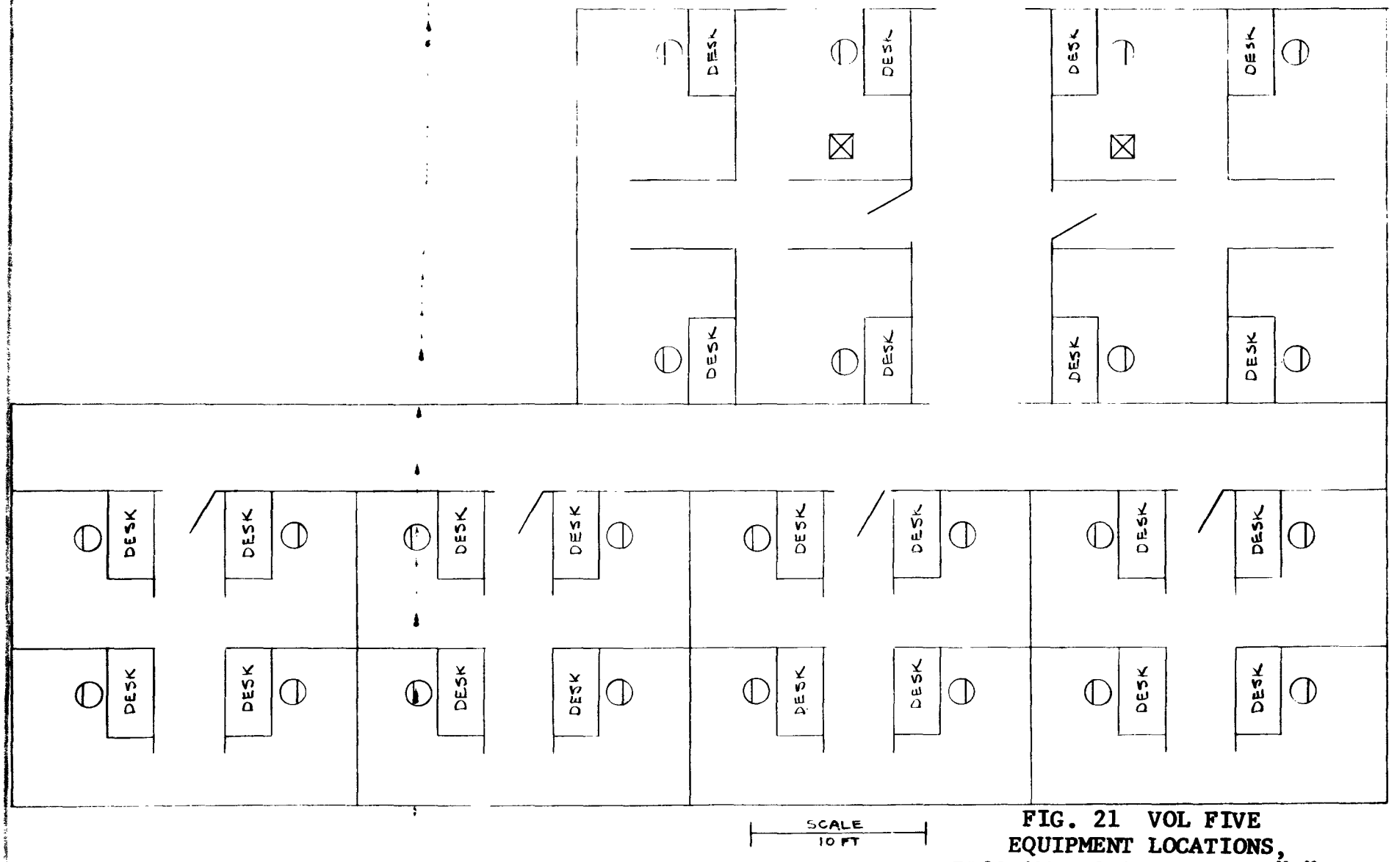
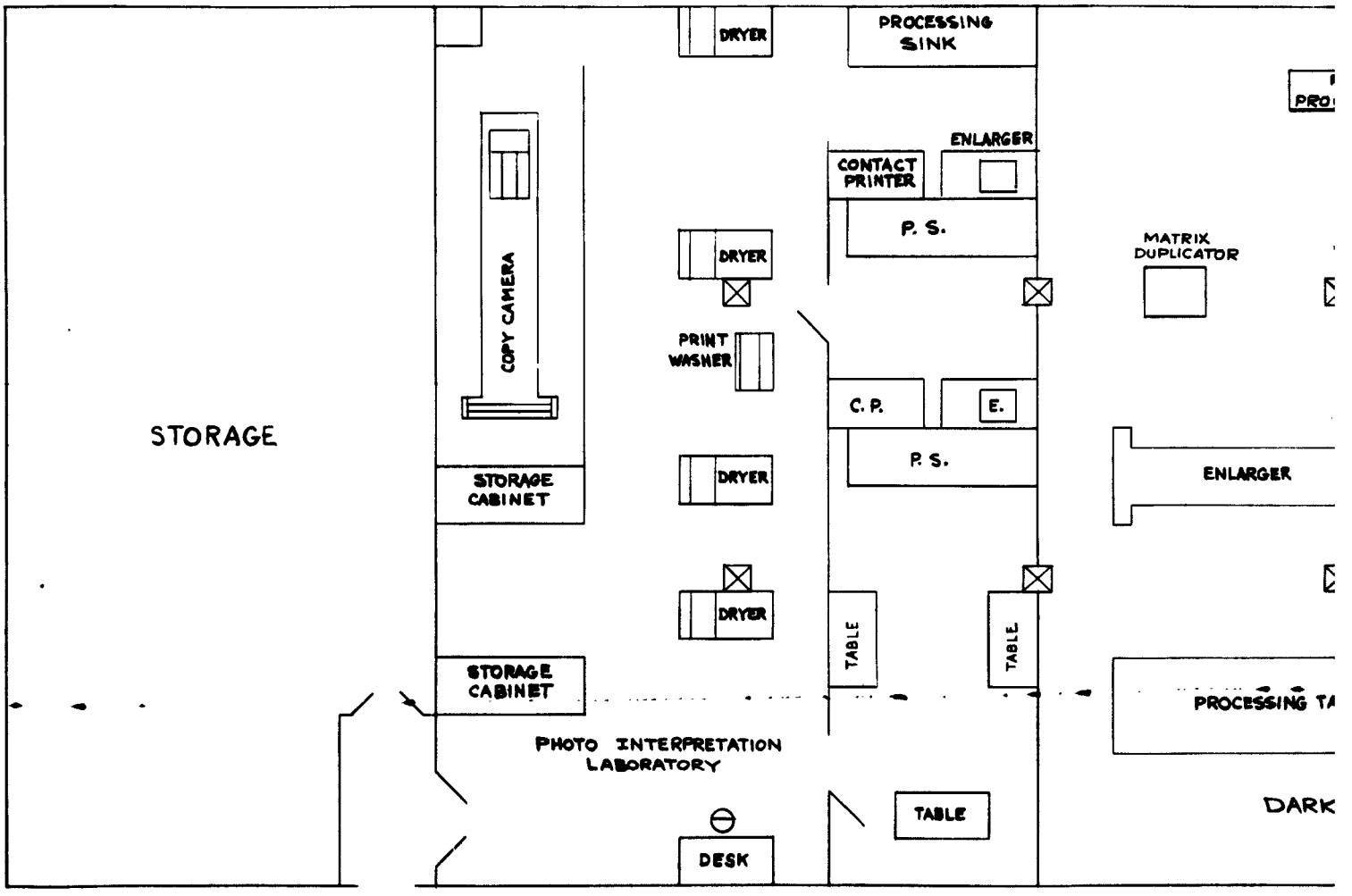
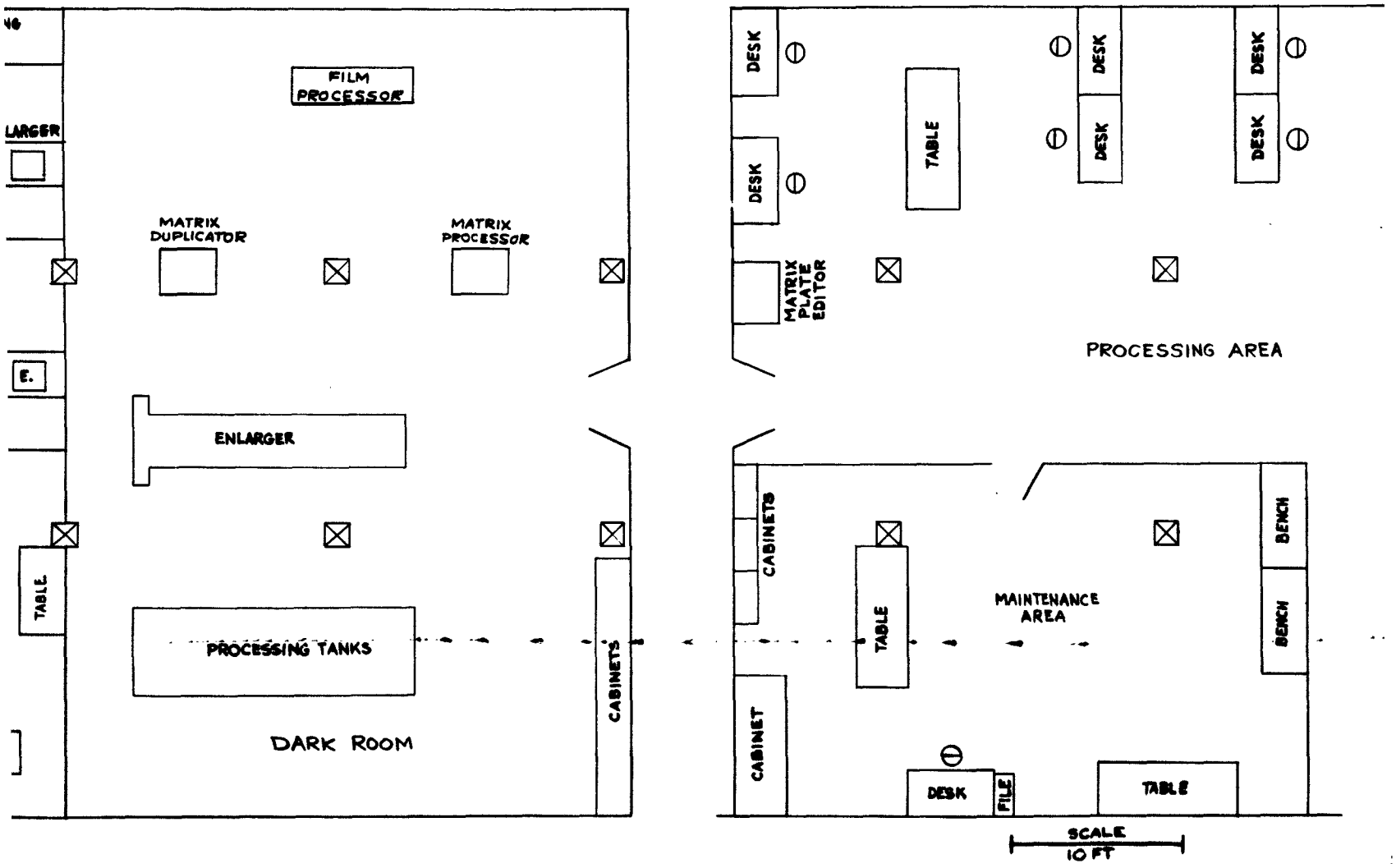


FIG. 21 VOL FIVE
EQUIPMENT LOCATIONS,
PROGRAMMERS AREA, SITE "A"


STORAGE
COPY CAMERA
STORAGE CABINET
STORAGE CABINET
DRYER
DRYER
PRINT WASHER
DRYER
DRYER
PROCESSING SINK
ENLARGER
CONTACT PRINTER
P. S.
C. P.
E.
P. S.
TABLE
TABLE
MATRIX DUPLICATOR
ENLARGER
PROCESSING TA
PHOTO INTERPRETATION LABORATORY
DESK
TABLE
DARK


FILM PROCESSOR
LARGER
MATRIX DUPLICATOR
MATRIX PROCESSOR
E.
ENLARGER
TABLE
PROCESSING TANKS
CABINETS
DARK ROOM
DESK
DESK
TABLE
DESK
DESK
DESK
DESK
MATRIX PLATE EDITOR
PROCESSING AREA
CABINETS
TABLE
MAINTENANCE AREA
BENCH
BENCH
CABINET
DESK
FILE
TABLE
SCALE
10 FT

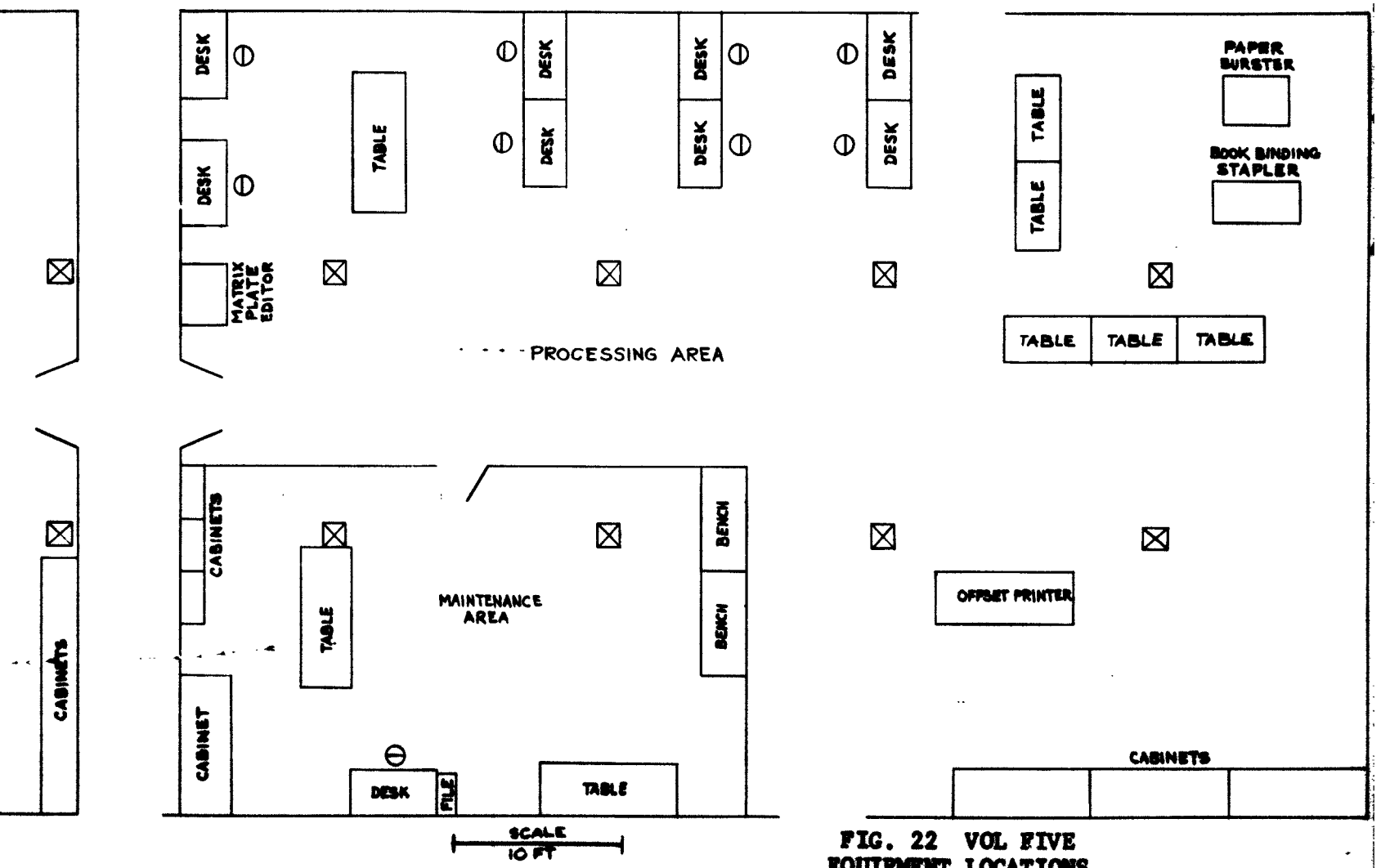
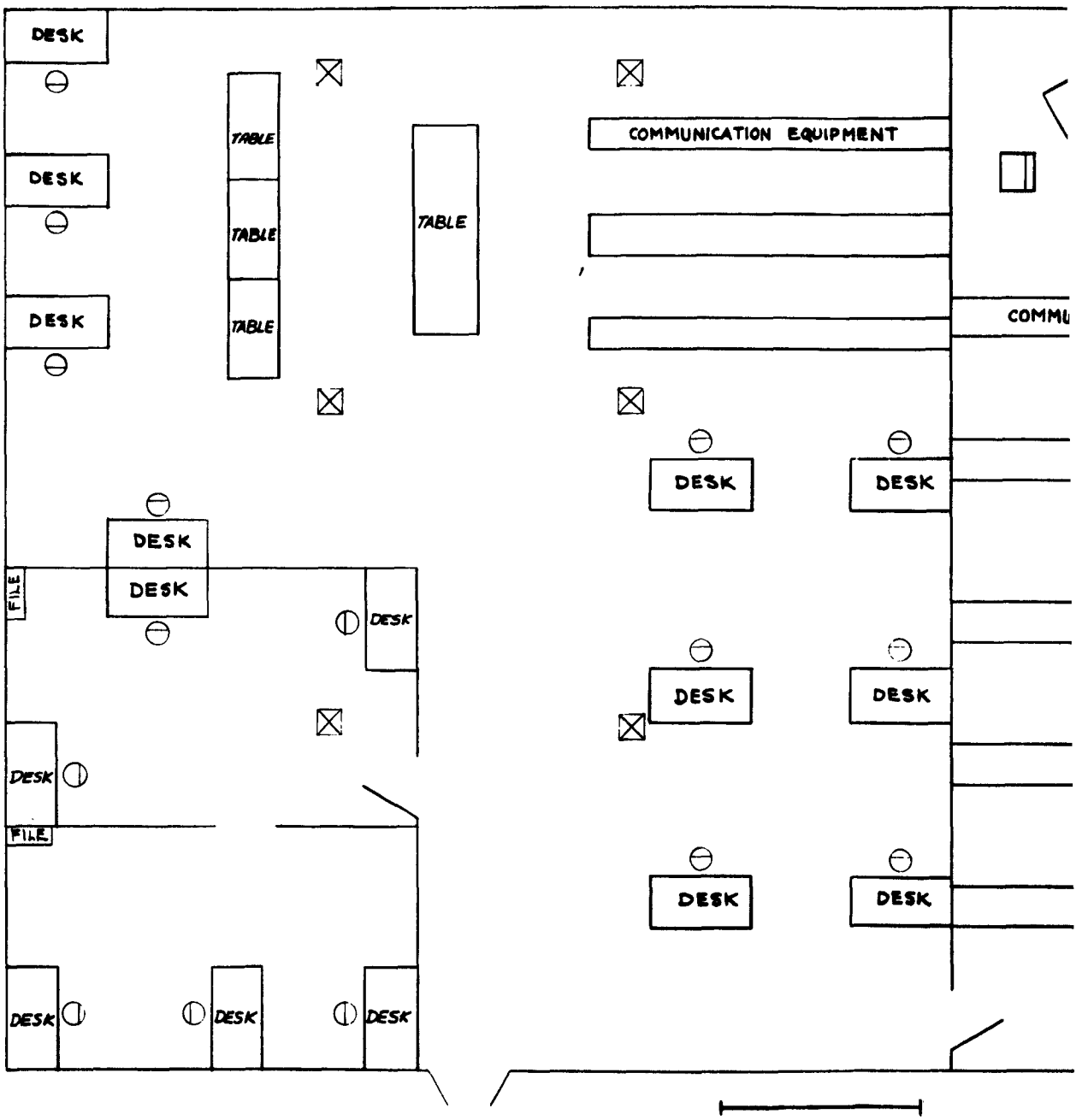


FIG. 22 VOL FIVE
EQUIPMENT LOCATIONS,
PROCESSING AREA, SITE "A"

1


DESK
DESK
DESK
TABLE
TABLE
TABLE
TABLE
COMMUNICATION EQUIPMENT
COMMU
DESK
DESK
DESK
DESK
FILE
DESK
DESK
DESK
DESK
DESK
FILE
DESK
DESK
DESK
DESK
DESK
DESK

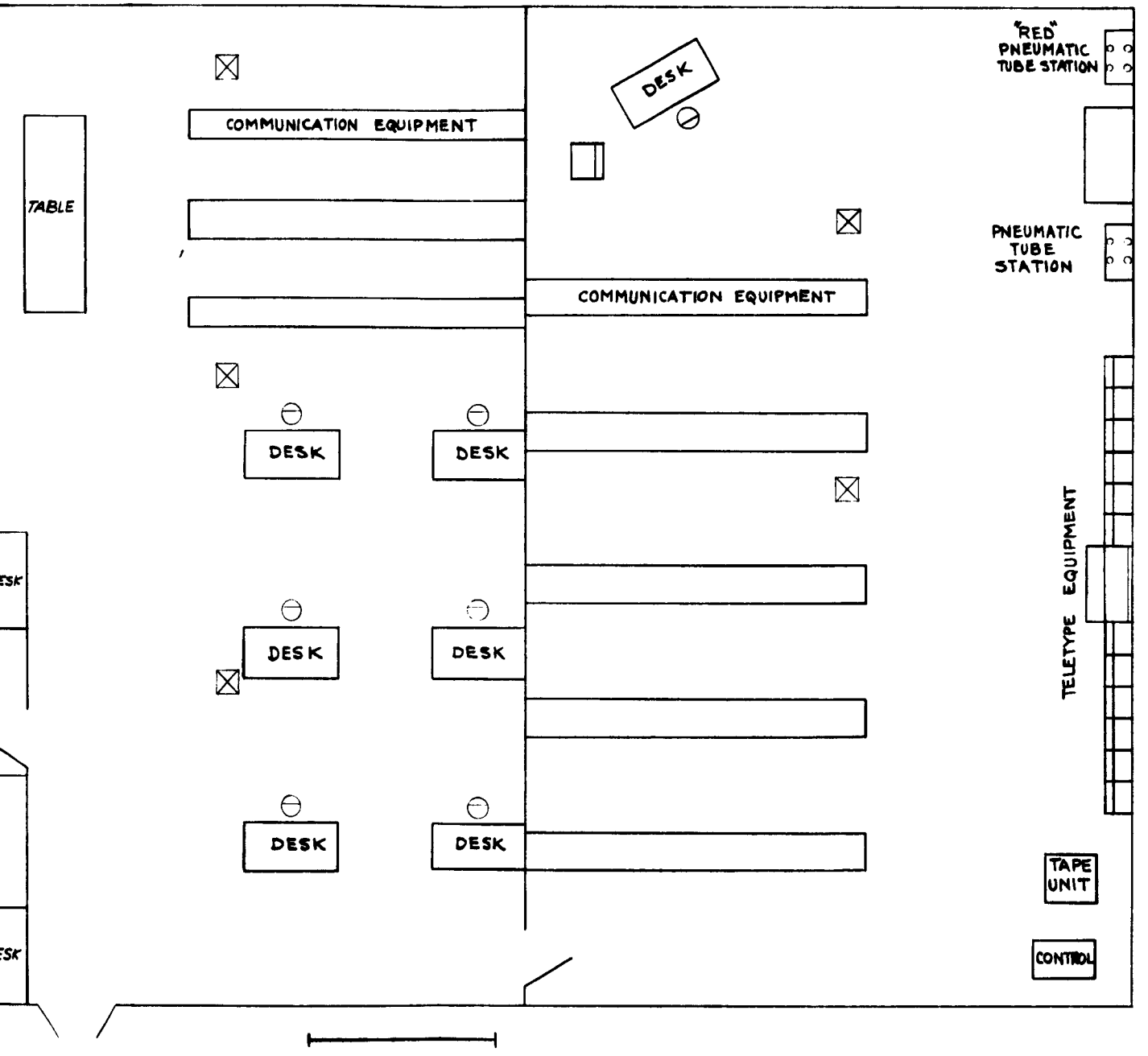


FIG. 23 VOL FIVE
EQUIPMENT LOCATIONS,
COMMUNICATIONS AREA, SITE "A"

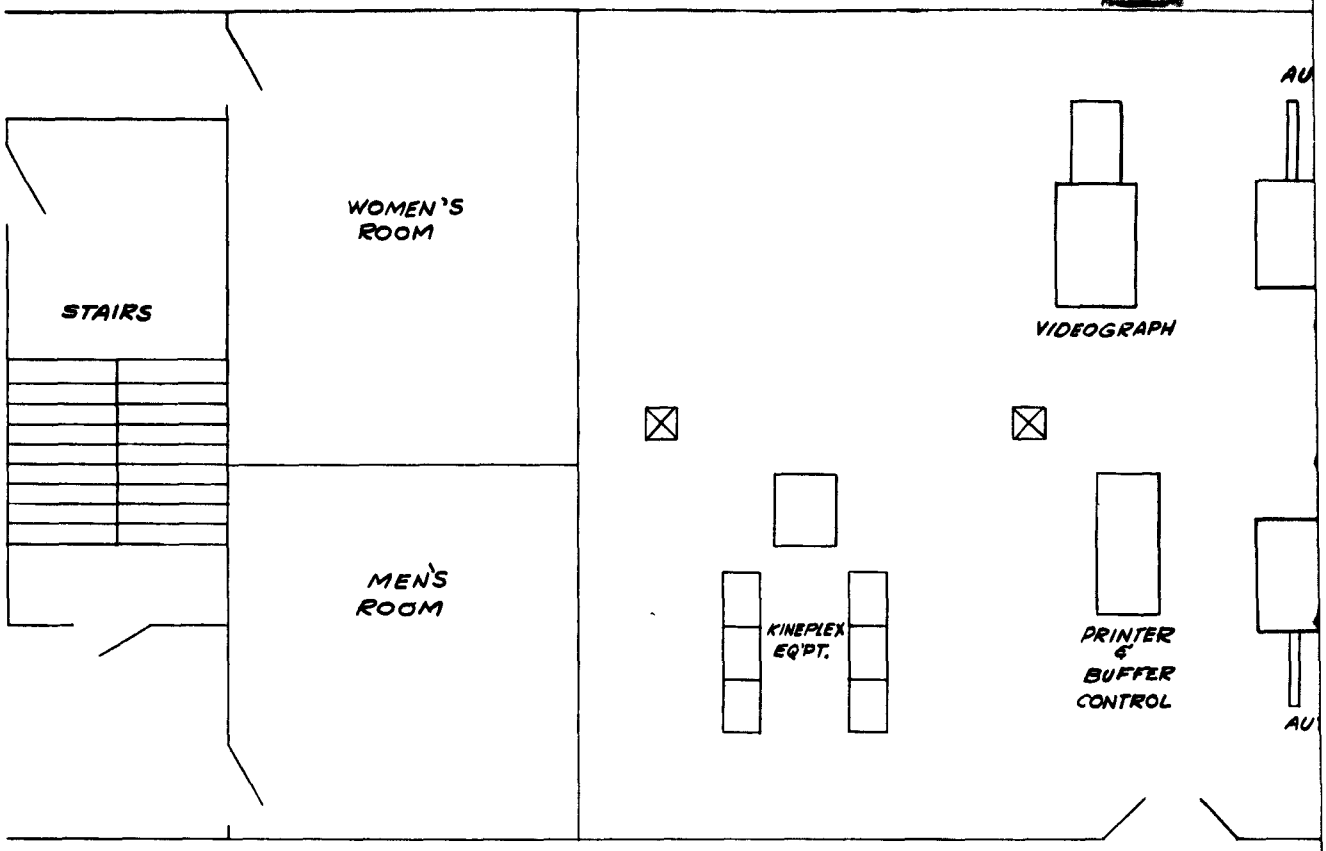


FIG.
EQUI
DOCUMENT RE

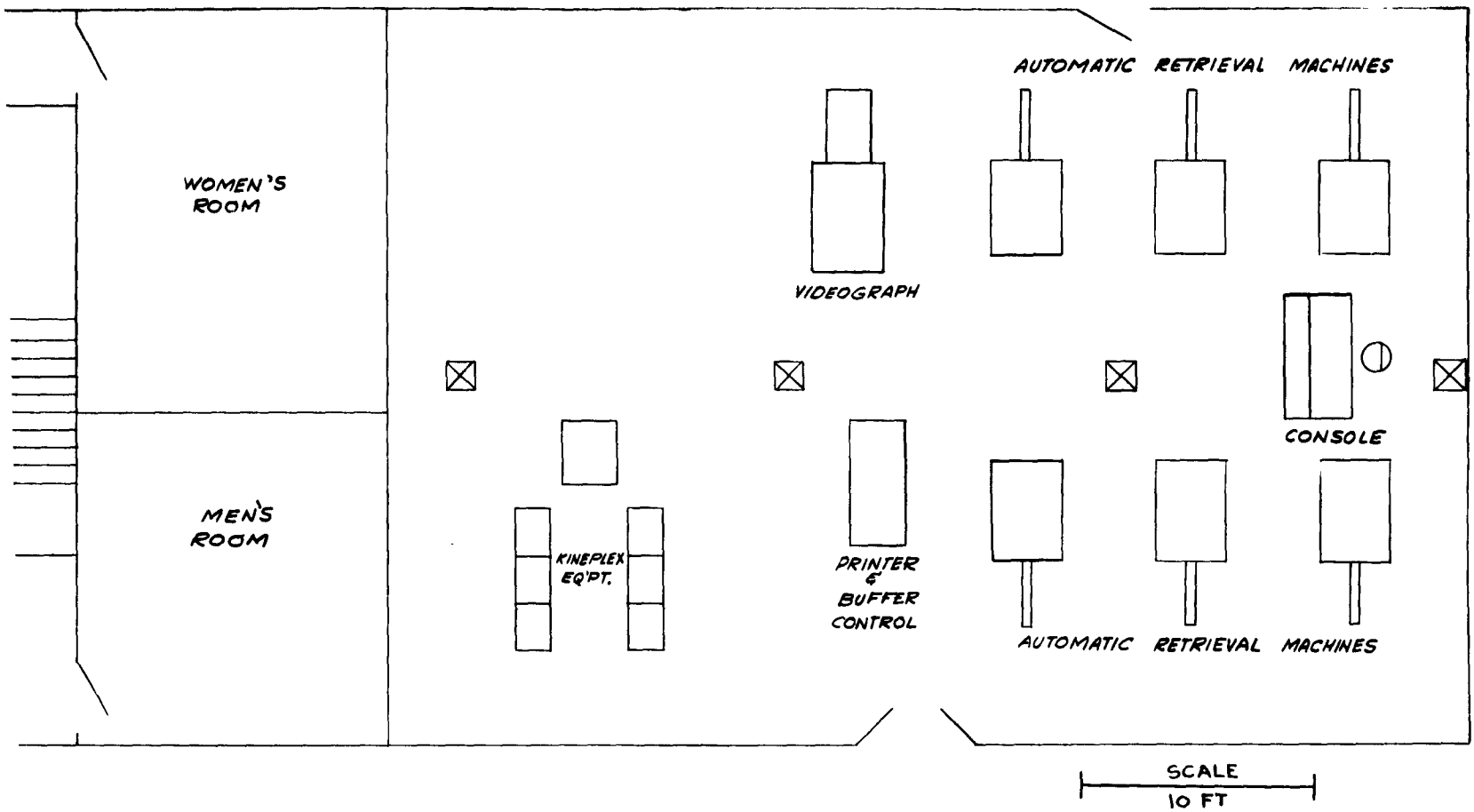
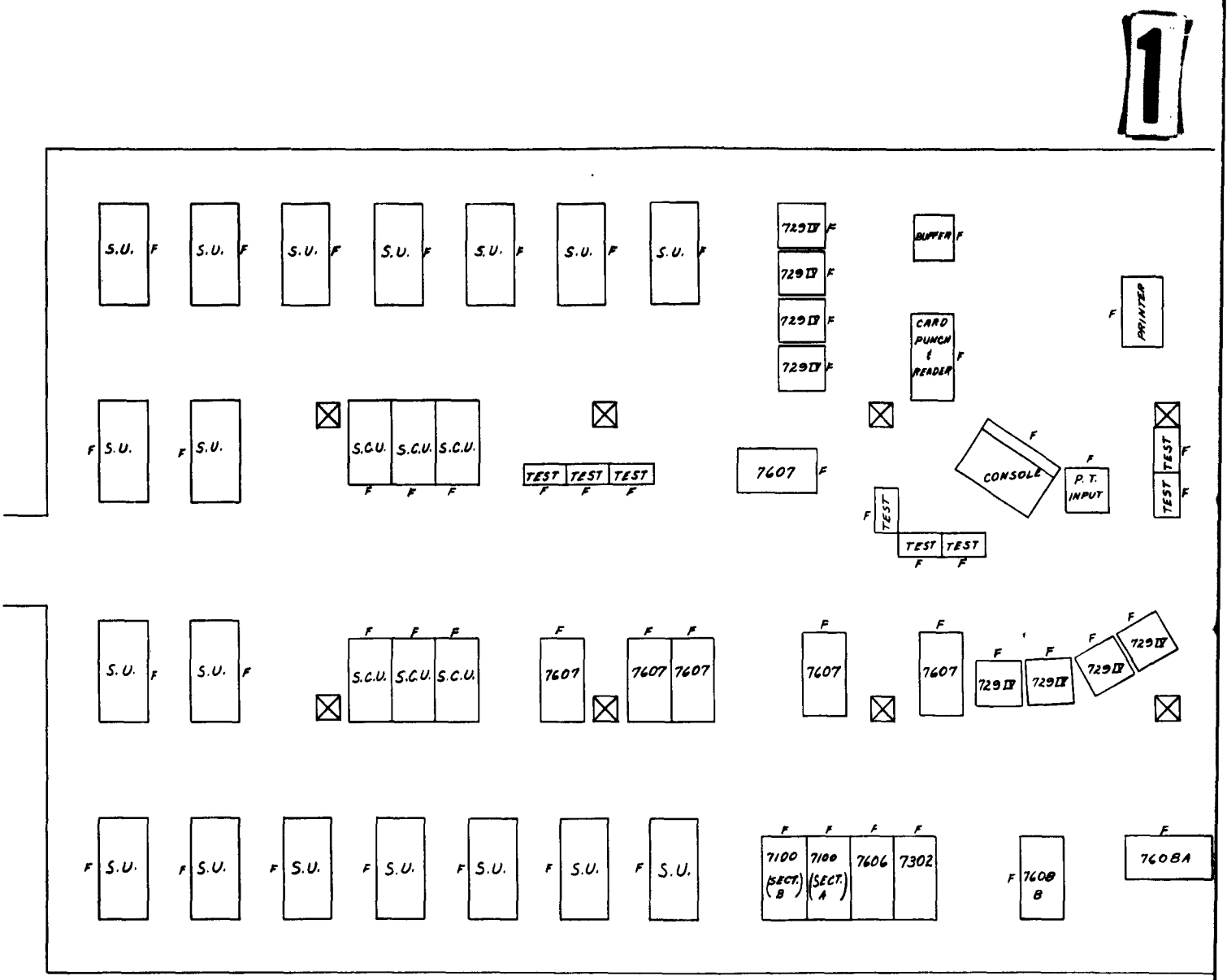


FIG. 24 VOL FIVE
EQUIPMENT LOCATIONS,
DOCUMENT RETRIEVAL AREA, SITE "A"


1
S.U.
S.U.
S.U.
S.U.
S.U.
S.U.
S.U.
729 IV
729 II
729 IV
729 IV
BUFFER
CARD PUNCH & READER
PRINTER
S.U.
S.U.
S.C.U.
S.C.U.
S.C.U.
TEST
TEST
TEST
7607
CONSOLE
P. T. INPUT
TEST
TEST
TEST
TEST
TEST
S.U.
S.U.
S.C.U.
S.C.U.
S.C.U.
7607
7607
7607
7607
7607
729 IV
729 II
729 IV
729 II
S.U.
S.U.
S.U.
S.U.
S.U.
S.U.
S.U.
7100 (SECT. B)
7100 (SECT. A)
7606
7302
7608 B
7608A

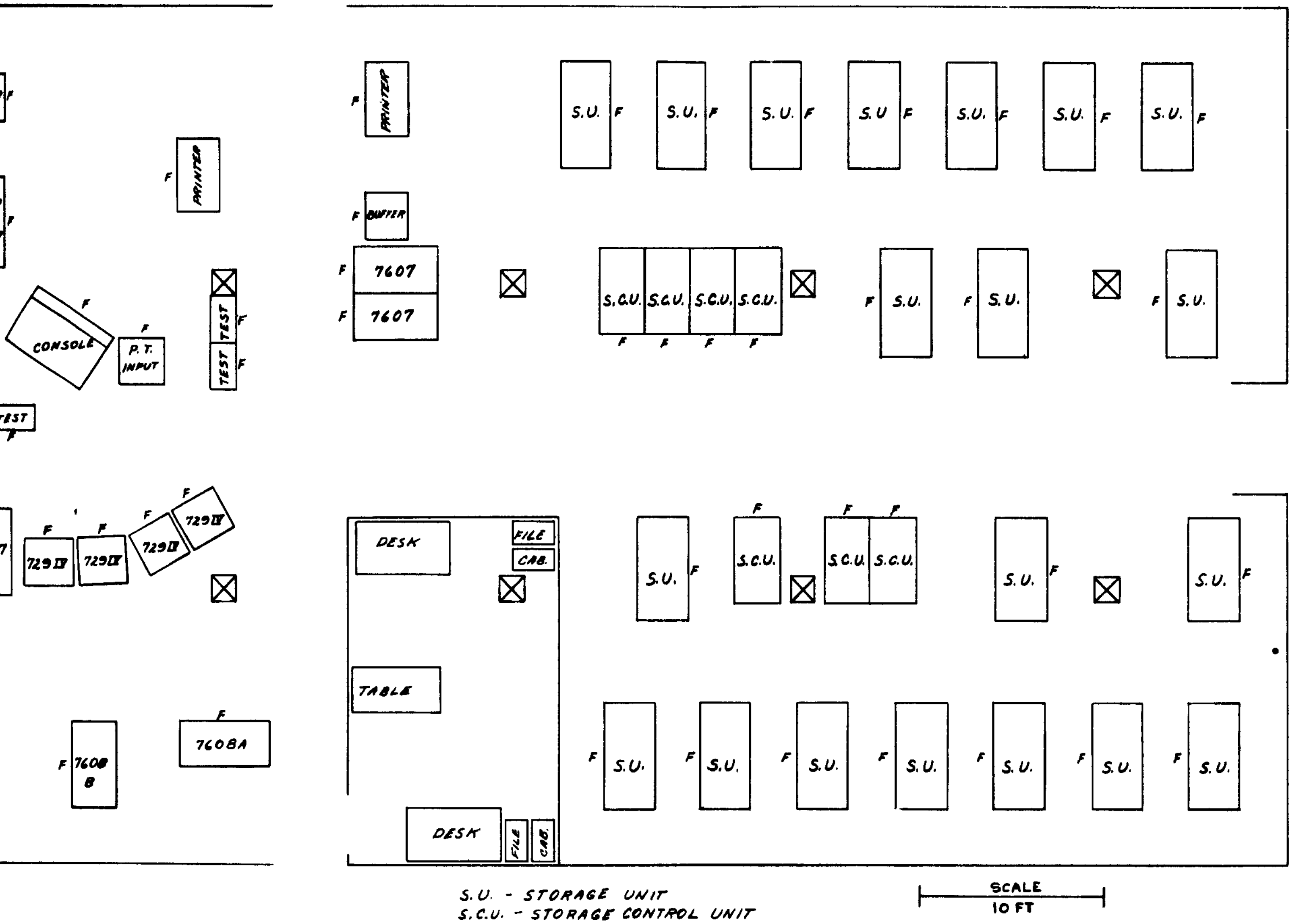
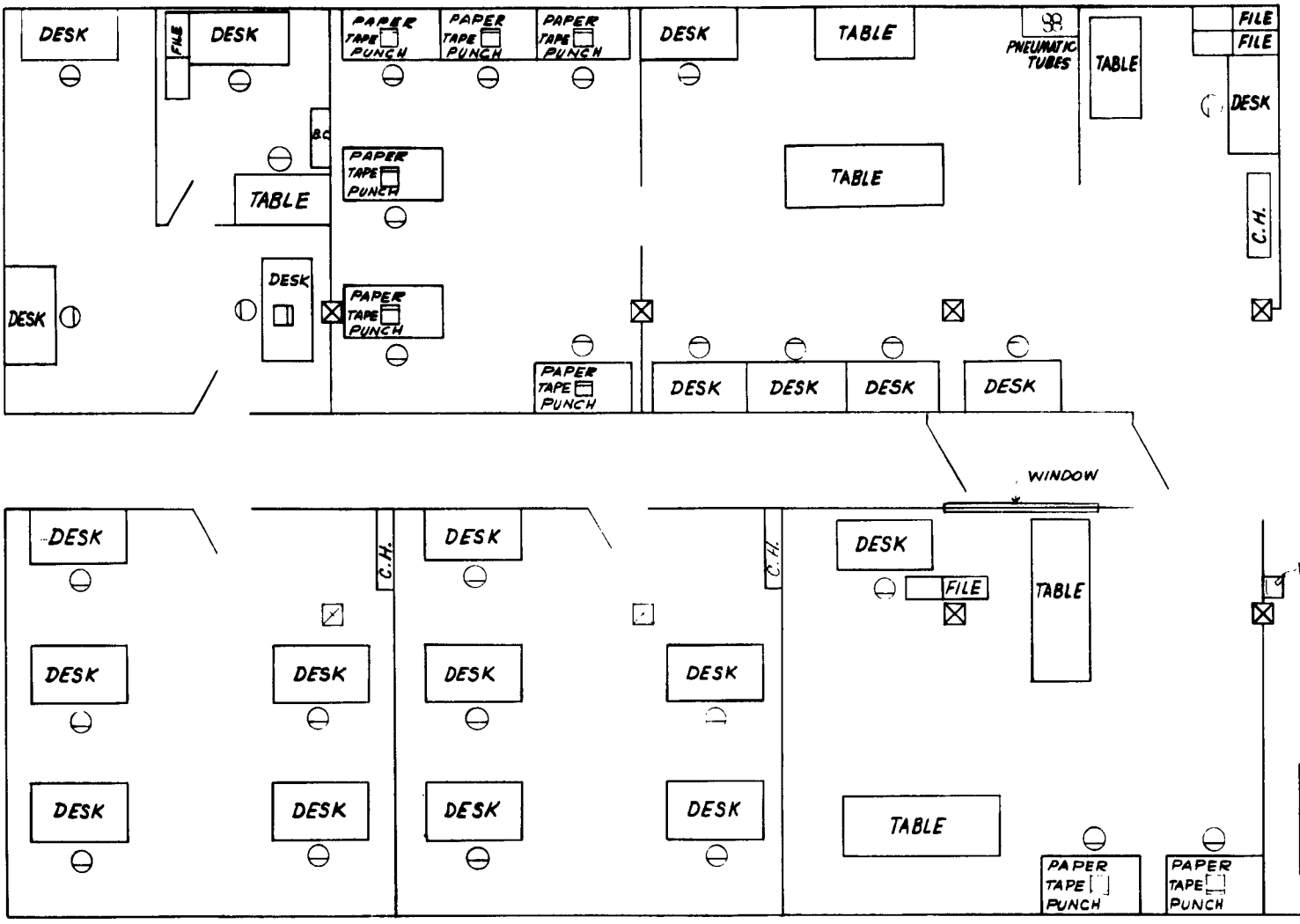


FIG. 25, VOL FIVE
EQUIPMENT LOCATIONS,
ON-LINE COMPUTER AREA, SITE "B'


DESK
FILE
DESK
PAPER TAPE PUNCH
PAPER TAPE PUNCH
PAPER TAPE PUNCH
DESK
TABLE
PNEUMATIC TUBES
TABLE
FILE
FILE
DESK
TABLE
C.H.
PAPER TAPE PUNCH
TABLE
DESK
DESK
PAPER TAPE PUNCH
PAPER TAPE PUNCH
DESK
DESK
DESK
DESK
WINDOW
DESK
C.H.
DESK
C.H.
DESK
FILE
TABLE
DESK
DESK
DESK
DESK
DESK
DESK
DESK
DESK
TABLE
PAPER TAPE PUNCH
PAPER TAPE PUNCH

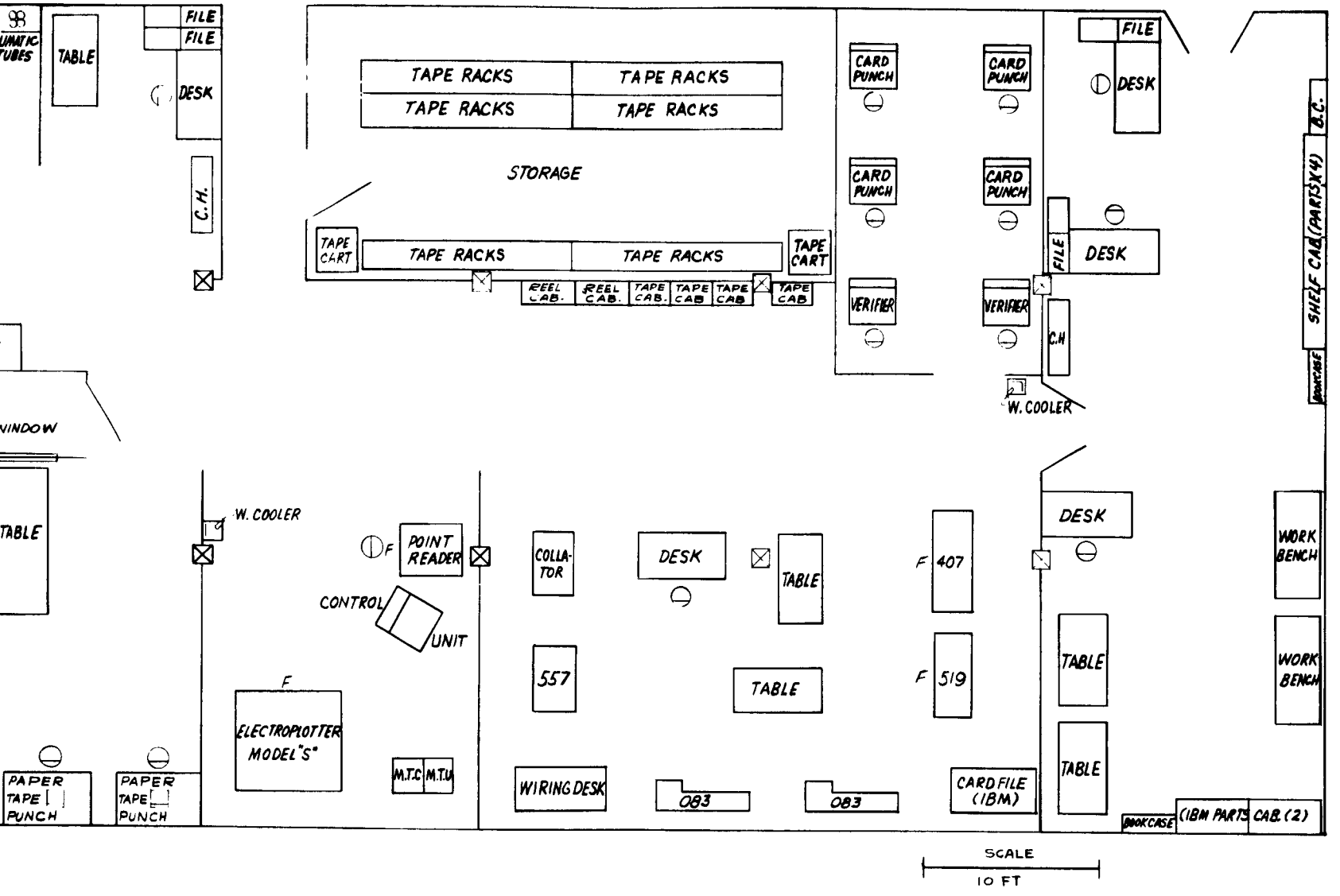
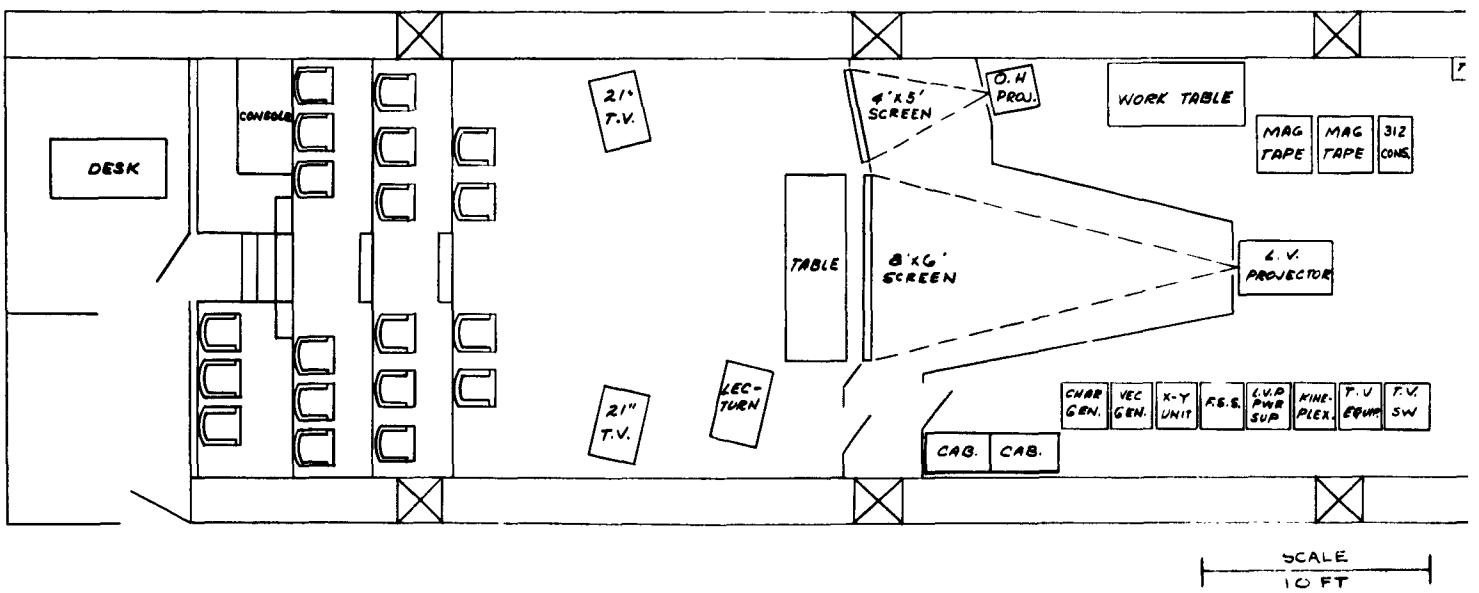


FIG. 26 VOL FIVE
EQUIPMENT LOCATIONS,
OFF-LINE COMPUTER AREA, SITE "A"

1


DESK
CONSOLE
21" T.V.
4'X5' SCREEN
O.H PROJ.
WORK TABLE
MAG TAPE
MAG TAPE
312 CONS.
TABLE
8'X6' SCREEN
L.V. PROJECTOR
21" T.V.
LEC-TURN
CHAR GEN.
VEC GEN.
X-Y UNIT
F.B.S.
L.V.P PWR SUP
KINE-PLEX.
T.V EQUIP.
T.V. SW
CAB.
CAB.
SCALE
10 FT

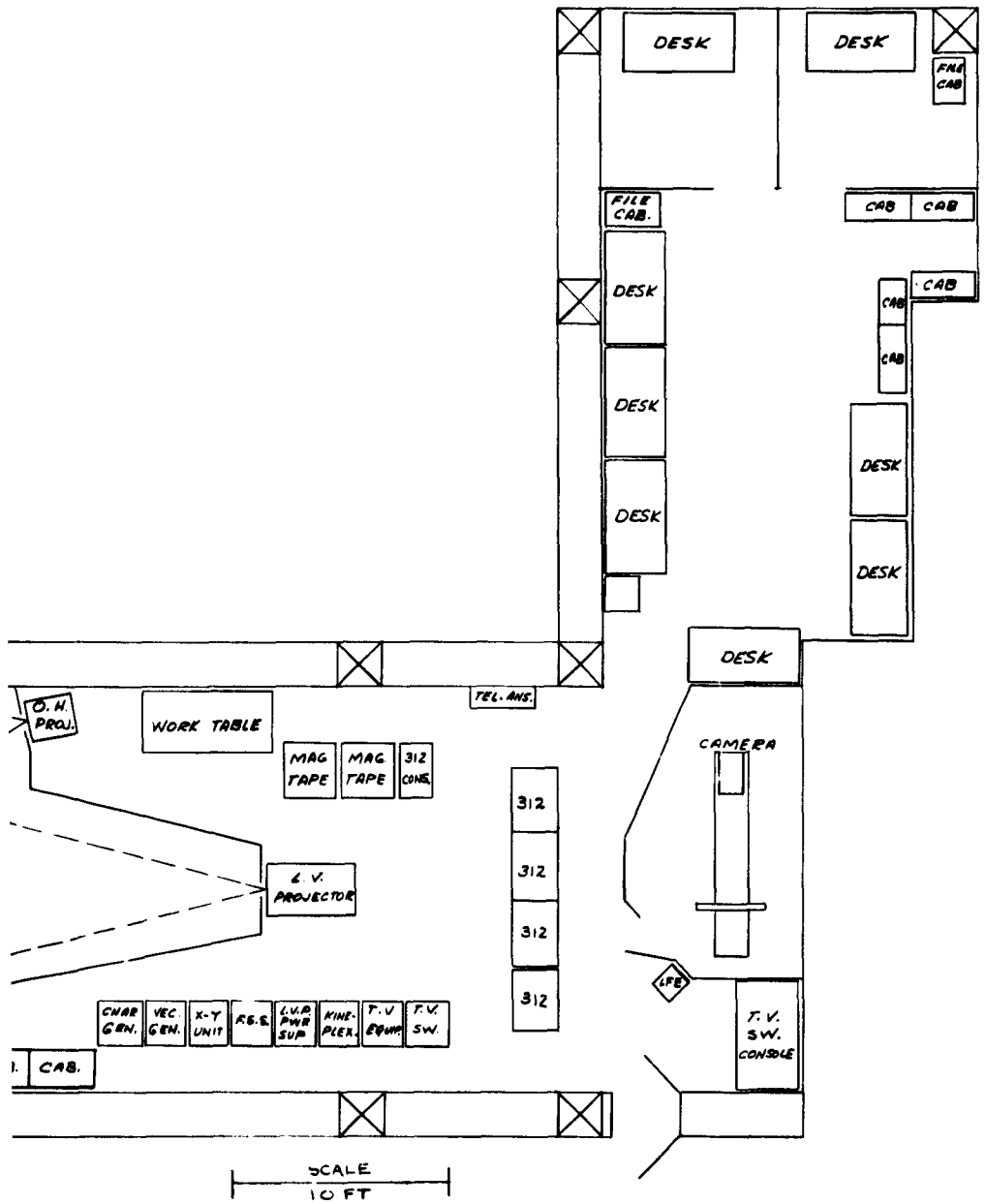
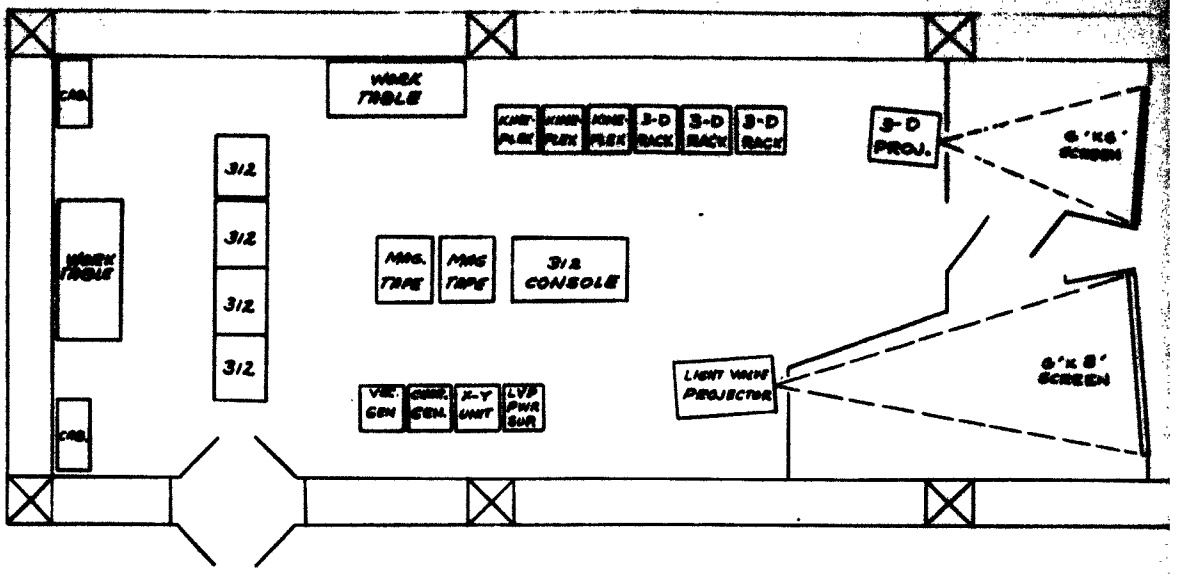
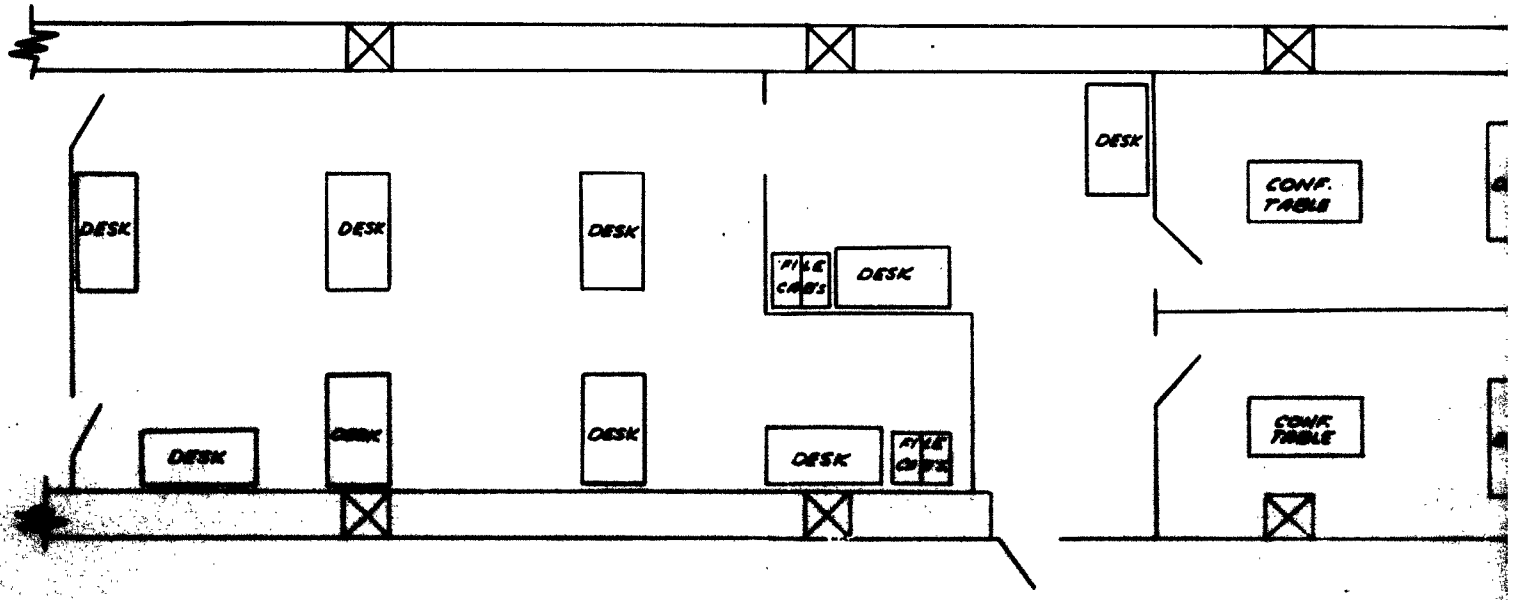
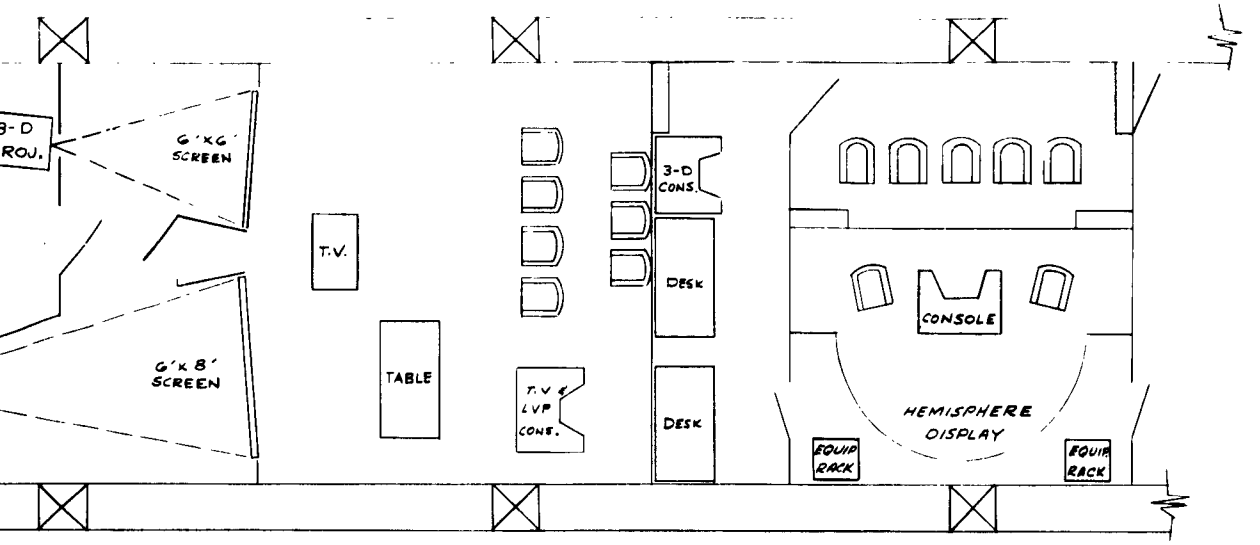


FIG. 27 VOL FIVE
EQUIPMENT LOCATIONS,
ROOM A, SITE "B"


CAB.
WORK TABLE
KINE-PLEX
KINE-PLEX
KINE-PLEX
3-D RACK
3-D RACK
3-D RACK
3-D PROJ.
6'X6' SCREEN
312
312
312
312
WORK TABLE
MAG. TAPE
MAG TAPE
312 CONSOLE
VEC. GEN
CHAR. GEN.
X-Y UNIT
LVP PWR SUP.
CAB.
LIGHT VALVE PROJECTOR
6'X 8' SCREEN


DESK
DESK
DESK
DESK
FILE CABS
DESK
DESK
DESK
DESK
DESK
DESK
CONF. TABLE
CONF. TABLE



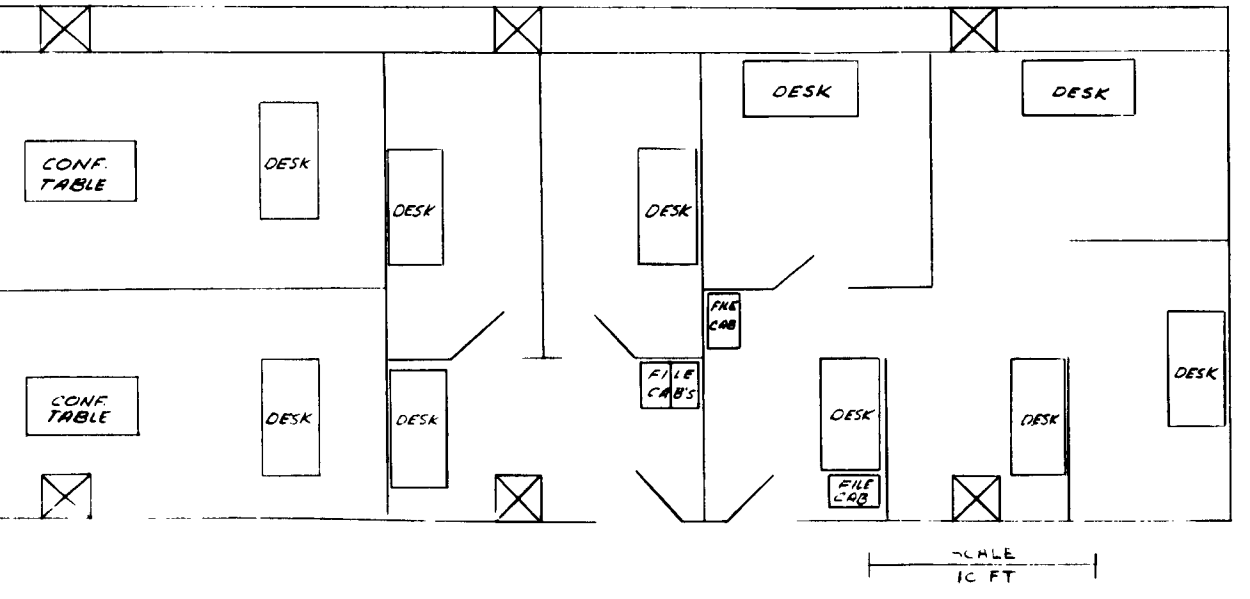
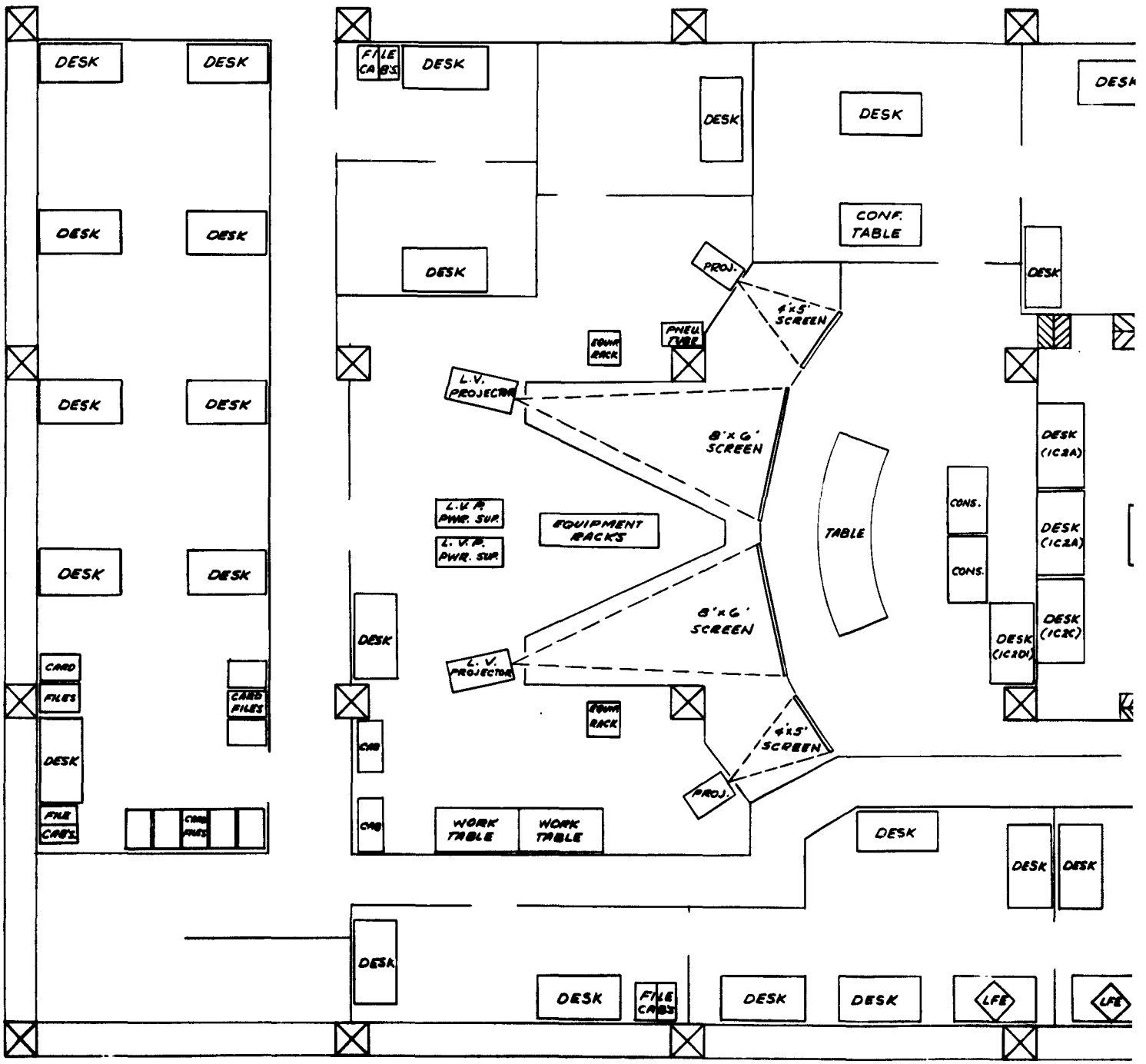
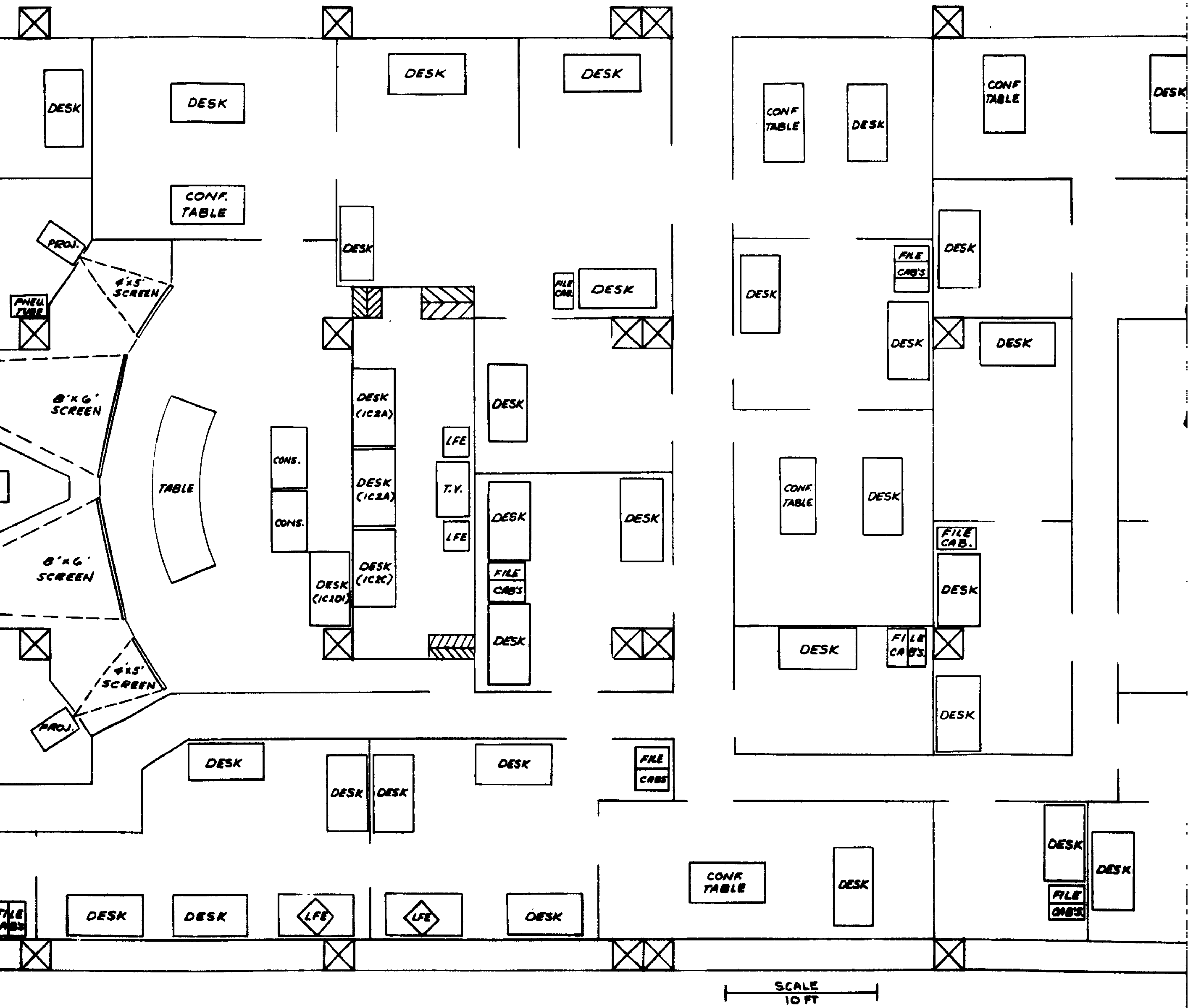


FIG. 28 VOL FIVE EQUIPMENT LOCATIONS, ROOM S, SITE "B"


DESK
DESK
DESK
DESK
DESK
DESK
DESK
DESK
DESK
DESK
CARD FILES
CARD FILES
DESK
FILE CAB'S.
CARD FILES
FILE CAB'S
DESK
DESK
DESK
DESK
DESK
CONF. TABLE
DESK
PROJ.
4'x5' SCREEN
PNEU. TUBE
SOUND RACK
L.V. PROJECTOR
8'x6' SCREEN
L.V.P. PWR. SUP.
L.V.P. PWR. SUP.
EQUIPMENT RACKS
TABLE
DESK (IC2A)
CONS.
CONS.
DESK (IC2A)
DESK (IC2D)
DESK (IC2C)
DESK
8'x6' SCREEN
L.V. PROJECTOR
SOUND RACK
4'x5' SCREEN
PROJ.
CAB
CAB
WORK TABLE
WORK TABLE
DESK
DESK
DESK
DESK
DESK
DESK
DESK
DESK
DESK
LFE
LFE


DESK
CONF. TABLE
PROJ.
4'x5' SCREEN
PNEU. TUBE
8'x6' SCREEN
TABLE
CONS.
DESK (IC2A)
DESK (IC2C)
DESK (IC2D)
LFE
T.V.
FILE CAB.
FILE CABS
CONF TABLE
FILE CAB'S
SCALE
10 FT

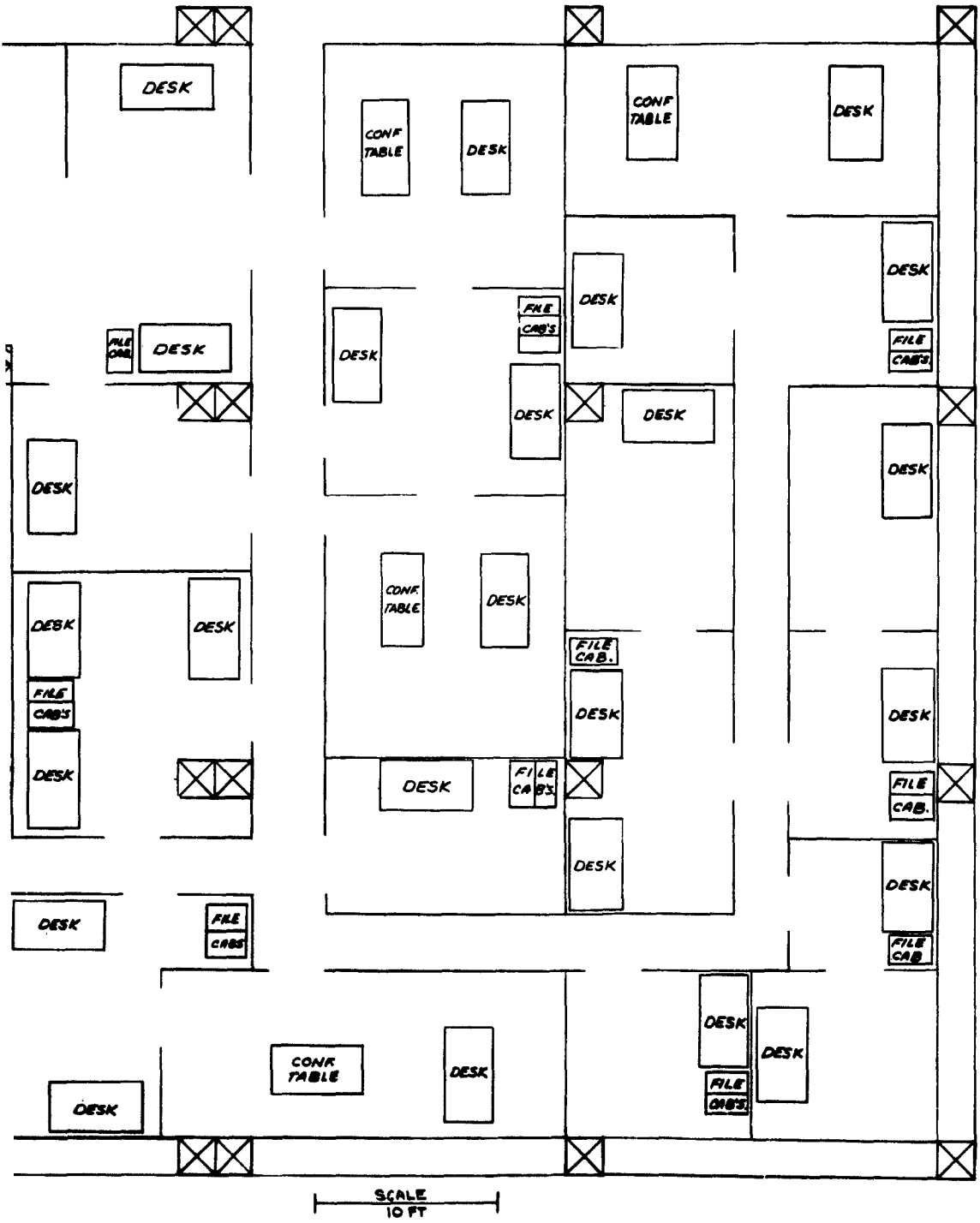
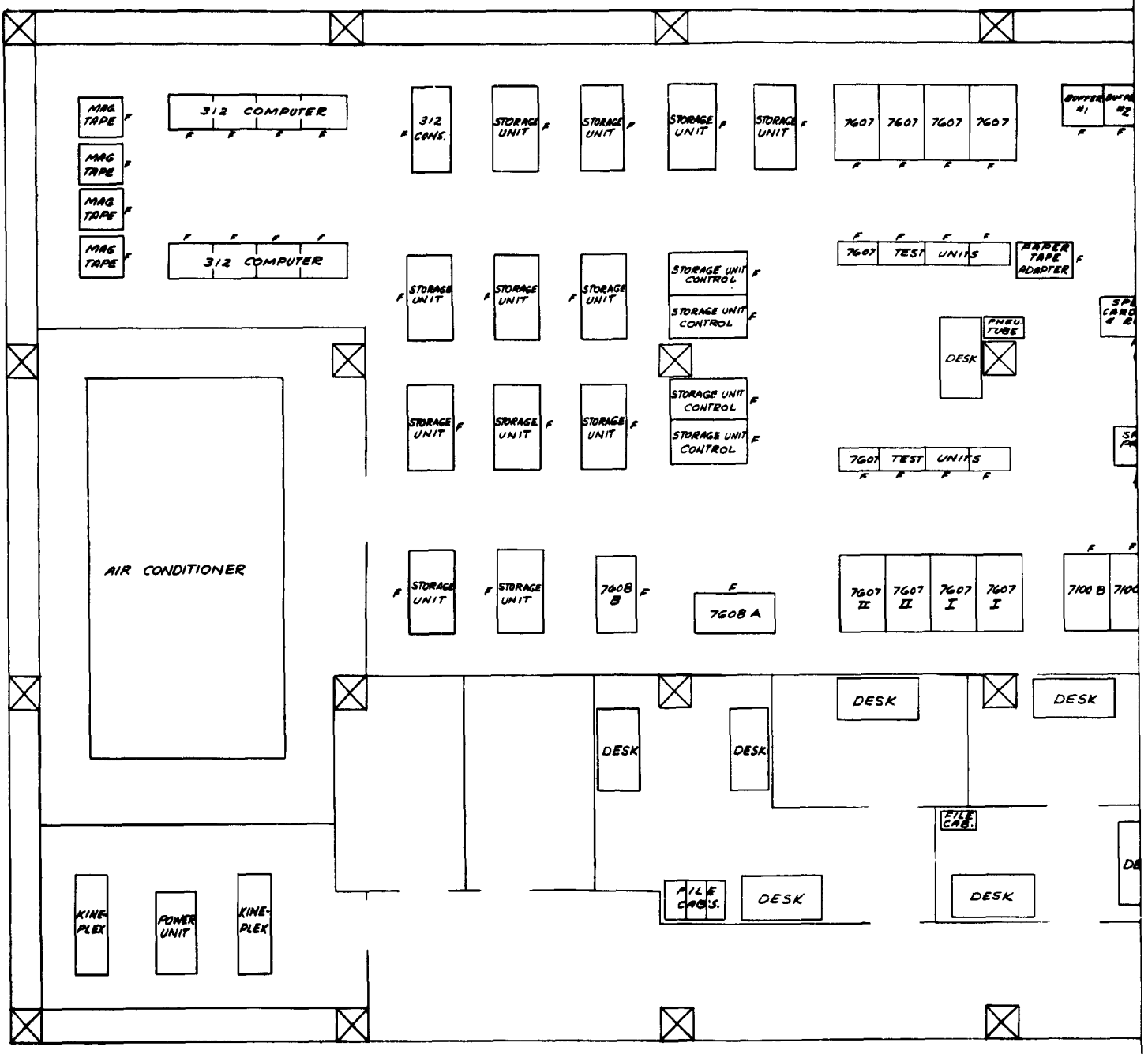
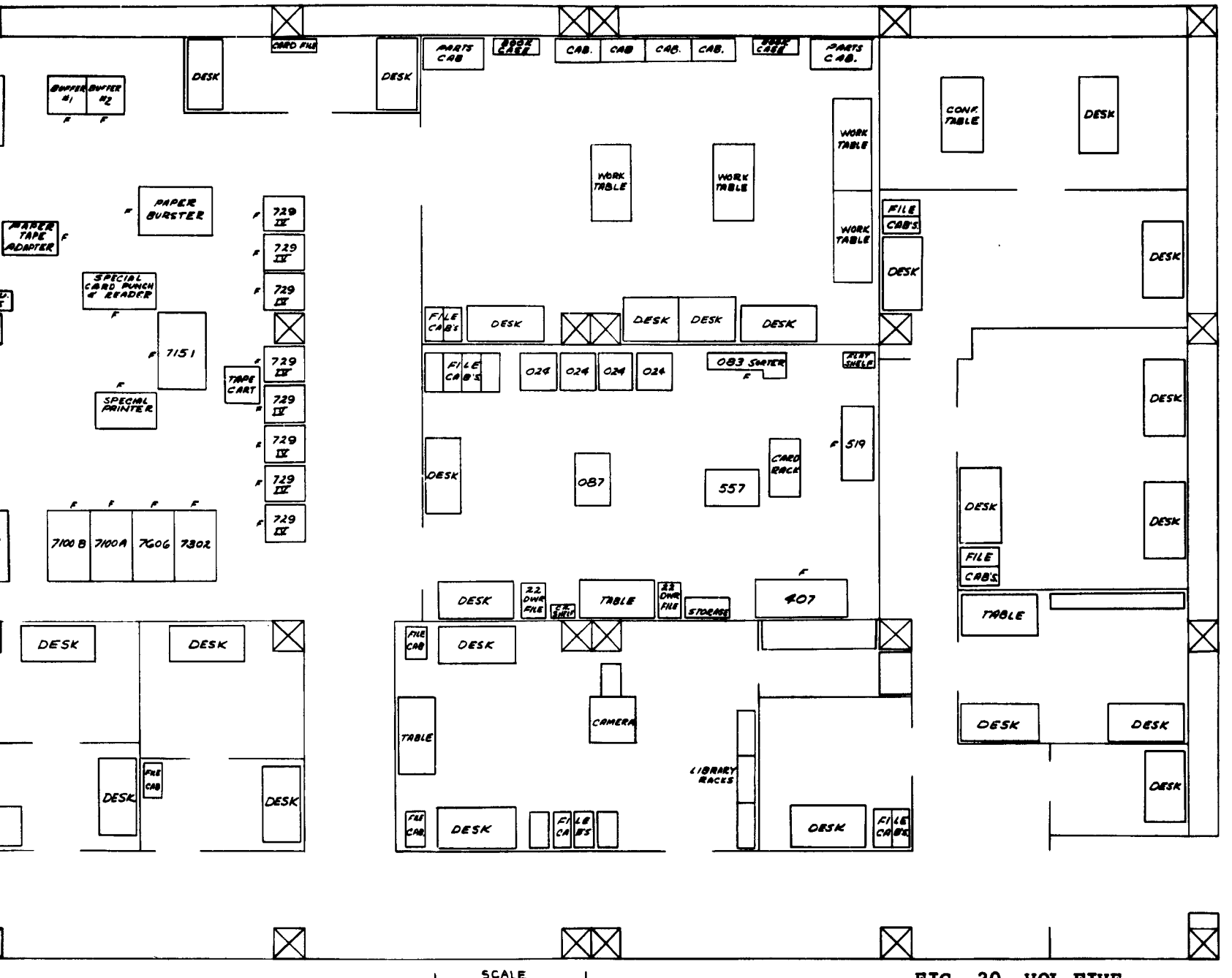


FIG. 29 VOL FIVE EQUIPMENT LOCATIONS, ROOM "W", SITE "B"

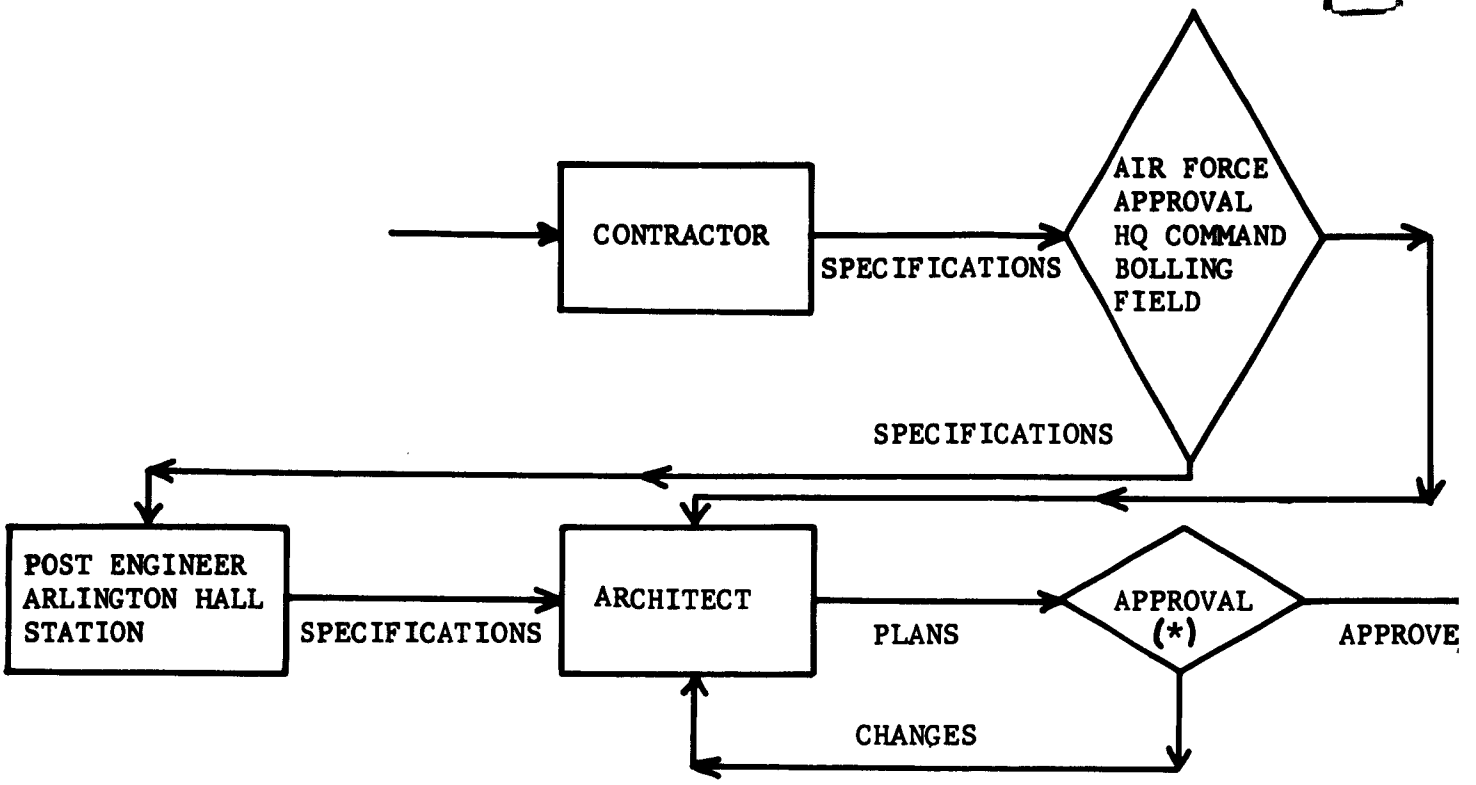

MAG TAPE
MAG TAPE
MAG TAPE
MAG TAPE
F
7090 COMPUTER
F F F F
7090 COMPUTER
F F F F
F
7090 CONS.
STORAGE UNIT
STORAGE UNIT
STORAGE UNIT
STORAGE UNIT
7607
7607
7607
7607
F F F F
BUFFER #1
BUFFER #2
7607
TEST
UNITS
F F F F
BINARY TAPE ADAPTER
STORAGE UNIT
STORAGE UNIT
STORAGE UNIT
STORAGE UNIT CONTROL
STORAGE UNIT CONTROL
PNEU. TUBE
DESK
STORAGE UNIT
STORAGE UNIT
STORAGE UNIT
STORAGE UNIT CONTROL
STORAGE UNIT CONTROL
7607
TEST
UNITS
F F F F
AIR CONDITIONER
STORAGE UNIT
STORAGE UNIT
7608 B
7608 A
7607 II
7607 II
7607 I
7607 I
7100 B
DESK
DESK
DESK
DESK
FILE CAB.
DESK
DESK
FILE CABS.
KINE-PLEX
POWER UNIT
KINE-PLEX



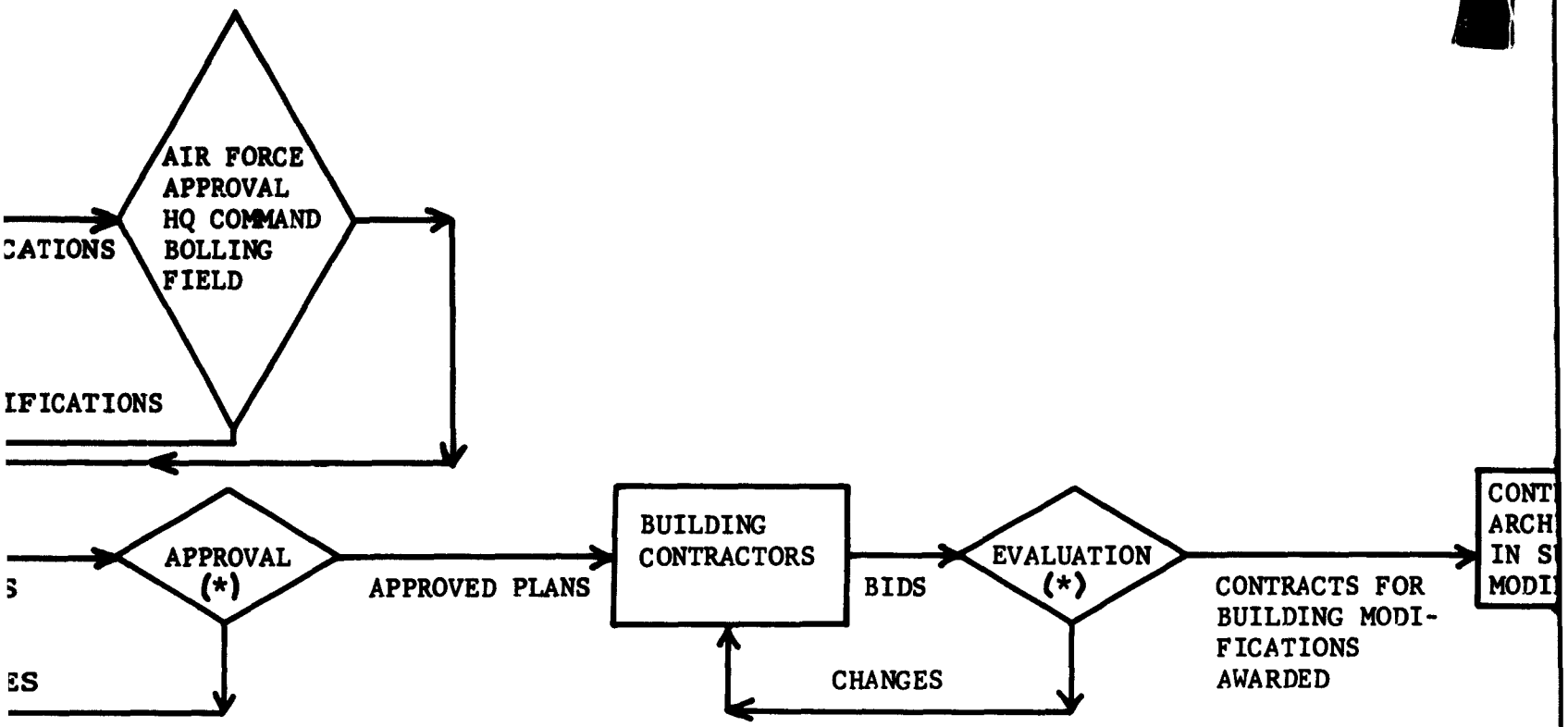
SCALE
10 FT

FIG. 30 VOL FIVE
EQUIPMENT LOCATIONS,
COMPUTER AREA, SITE "B"

1

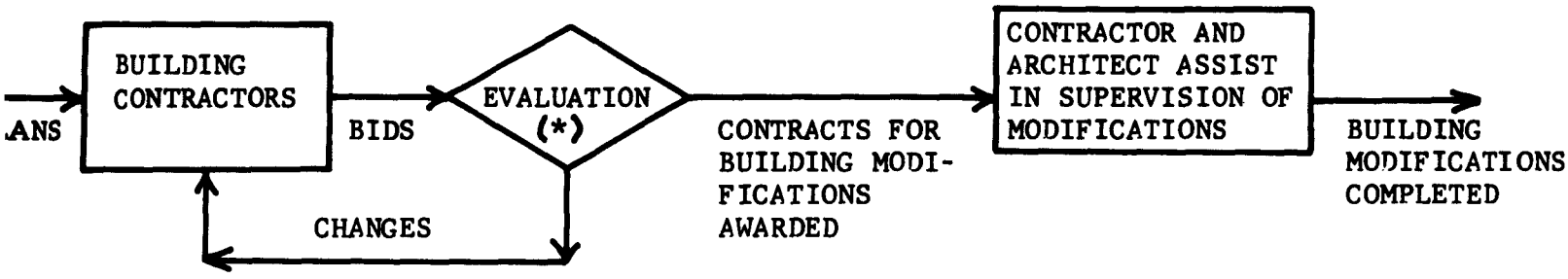


(*) CONTRACTOR AND ARCHITECT ASSIST



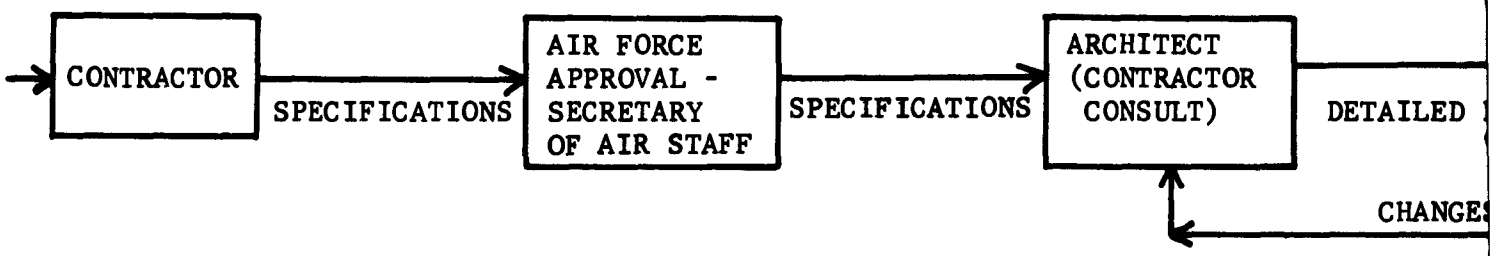
TYPICAL TIMING	WEEKS
ARCHITECT PREPARES APPROVED PLANS	10
BUILDING MODIFICATIONS CONTRACTS LET	5
BUILDING MODIFICATIONS COMPLETED	13
	28

FIG
F
BUILDING M



CAL TIMING	WEEKS
ITECT PREPARES APPROVED PLANS	10
DING MODIFICATIONS CONTRACTS LET	5
DING MODIFICATIONS COMPLETED	13
	28

FIG. 31 VOL FIVE
FLOW DIAGRAM
BUILDING MODIFICATIONS SITE "A"



* CONTRACTOR AND ARCHITECT ASSIST

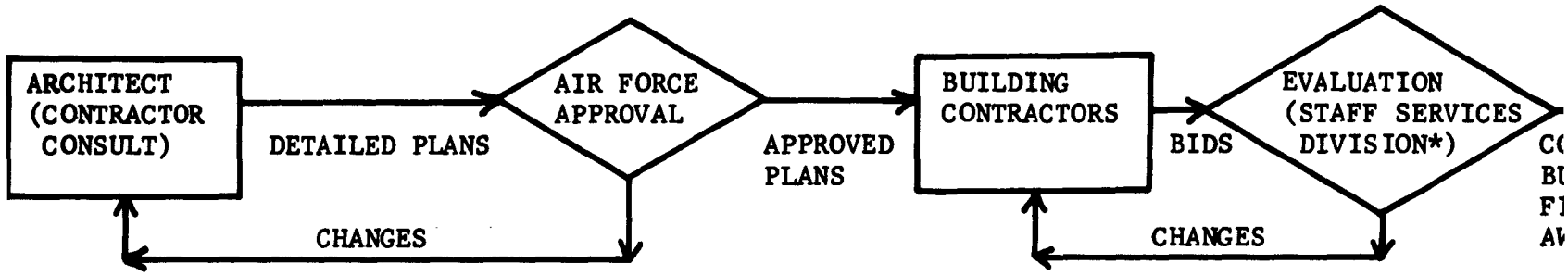


FIG. 32
FLOW
BUILDING MODIF

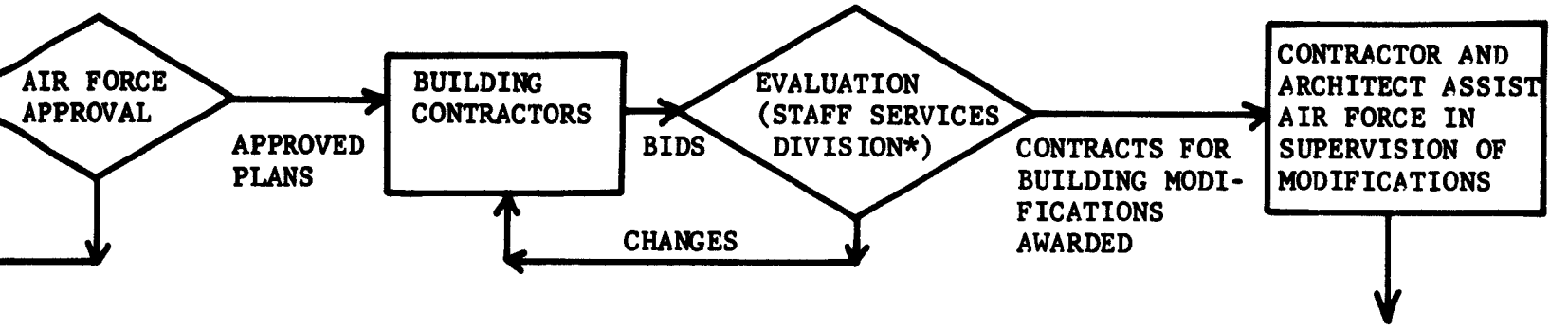


FIG. 32 VOL FIVE
FLOW DIAGRAM
BUILDING MODIFICATIONS SITE "B"

NUMBER	NAME	DESIGNATION	ALTERNATE
1	VOLTMETER	SIMPSON, MODEL 260	TRIPLET, MULTIMETER
2	HOOK-ON VOLT-AMMETER	GENERAL ELECTRIC, TYPE AK-1 CAT. NO. 99X33 (CASE OPTIONAL)	
3	FUSE PULLER SET	GENERAL ELECTRIC, CAT. NO 34-001, MIDGET SIZE; CAT. NO. 34-002, POCKET SIZE; CAT. NO. 34-003, GIANT SIZE	
4	PHASE SEQUENCE INDICATOR	GENERAL ELECTRIC, CAT. NO. 5467032G5 (CASE SUPPLIED)	
5	TELEPHONE HEADSET, PORTABLE	EE-8 (MILITARY VERSION)	
6	VELOCITY METER	ALNOS, ILLINOIS TESTING LAB, INC.	
*7	THERMOMETER, GLASS TYPE		
8	THERMOMETER RESISTANCE	LEEDS AND NORTHUP COMPANY	
*9	LEVEL	16-INCH CARPENTER LEVEL	

* DENOTES LOCAL HARDWARE PURCHASE

	DESIGNATION	ALTERNATE	QUANTITY	USE
	SIMPSON, MODEL 260	TRIPLET, MULTIMETER	4	ELECTRICAL TROUBLE-SHOOTING
ETER	GENERAL ELECTRIC, TYPE AK-1 CAT. NO. 99X33 (CASE OPTIONAL)		3	POWER TROUBLE-SHOOTING
	GENERAL ELECTRIC, CAT. NO 34-001, MIDGET SIZE; CAT. NO. 34-002, POCKET SIZE; CAT. NO. 34-003, GIANT SIZE		4	REPLACE FUSES
NDICATOR	GENERAL ELECTRIC, CAT. NO. 5467032G5 (CASE SUPPLIED)		2	DETERMINE ROTATION OF 3-PHASE POWER
',	EE-8 (MILITARY VERSION)		4	TEMPORARY COMMUNICATIONS BETWEEN AREAS
	ALNOS, ILLINOIS TESTING LAB,INC.		2	MEASURE AIR FLOW
S TYPE			6	TEMPERATURE MEASUREMENT
TANCE	LEEDS AND NORTHUP COMPANY		6	TEMPERATURE MEASUREMENT
	16-INCH CARPENTER LEVEL		2	LEVEL MEASUREMENT

PURCHASE

FIG. 33 VOL FIVE
TEST EQUIPMENT LIST

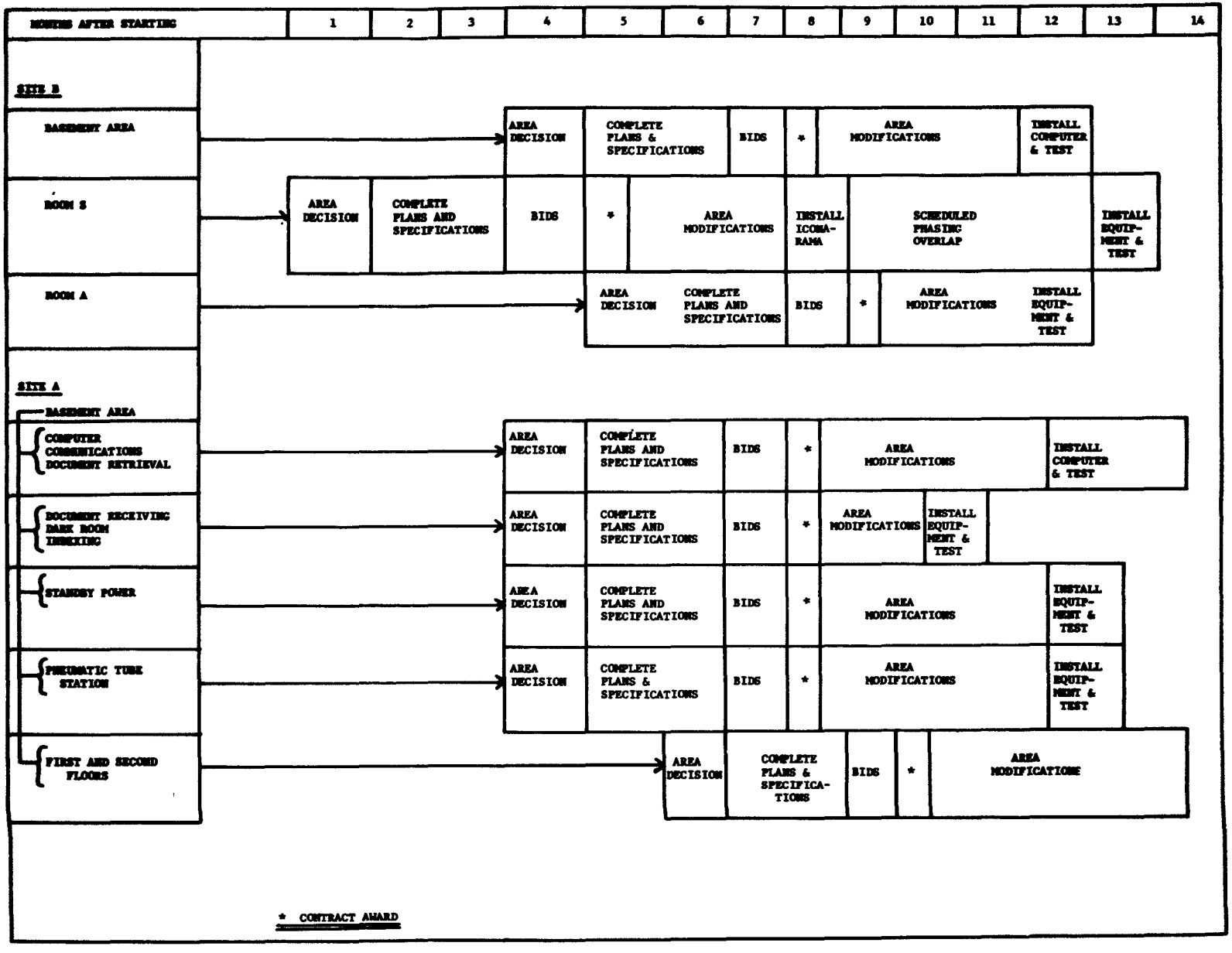


FIG. 34 VOL FIVE
INSTALLATION
PHASING SCHEDULE